



NFPA Technical Committee on Wildland and Rural Fire Protection

NFPA 1141 AND NFPA 1142 FIRST DRAFT MEETING AGENDA Nov. 4-5, 2014 New Orleans, LA

Tuesday, Nov. 4, 2014

- 8:00am – Meeting Called to Order
- Welcome and Introductions
- Remarks from the Chair
- Staff Liaison Overview
 - Review of NFPA Standards Development Process
 - Committee Discussion
- Fire Protection Research Foundation – Research Update
- Lunch Break
- New Business
 - NFPA 1141 – Process Public Inputs (Attachment A) and Create First Revisions
 - NFPA 1142 – Process Public Inputs (Attachment B) and Create First Revisions

Wednesday, Nov. 5, 2014

- 8:00am – Meeting Called to Order
- Continue New Business
 - NFPA 1141 – Process Public Inputs (Attachment A) and Create First Revisions
 - NFPA 1142 – Process Public Inputs (Attachment B) and Create First Revisions
- Wrap Up 5:00pm

ATTACHMENT A



Public Input No. 11-NFPA 1141-2013 [New Section after 1.3.4.6.2]

1.3.4.6.3 When a requirement in a referenced document is more restrictive than this standard, the requirements of the referenced document shall apply.

Statement of Problem and Substantiation for Public Input

Section 1.3.6.1 guides the user in what course of action is appropriate when the referenced document is less stringent. However, there is no guidance to use on what to do if the referenced documents are more stringent. Inserting this provision provides that needed guidance to the user.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Wed Oct 30 13:33:07 EDT 2013



Public Input No. 3-NFPA 1141-2013 [Section No. 1.3.5.1]

1.3.5.1

The AHJ- The applicant for a land development or land use change shall provide written documentation and illustrative maps that specify areas that will be included in the proposed land development or land use change.

Statement of Problem and Substantiation for Public Input

The burden to provide documentation and maps regarding a land use change should rest on the applicant for such change, not the AHJ. If the AHJ is the applicant, then the AHJ should provide it. If the applicant is a developer, then the developer should provide the supporting documentation.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Tue Oct 29 15:52:55 EDT 2013



Public Input No. 4-NFPA 1141-2013 [Section No. 1.3.5.2]

1.3.5.2

One or more published public announcements shall be made of one or more public hearings where ~~the AHJ~~ the applicant for the land development or land use change presents the proposed areas of adoption of the land development or land use change, outlines hazard profiles using best applicable data, and allows testimony by the public.

Statement of Problem and Substantiation for Public Input

The burden to advocate for a land use change should rest on the applicant for such change, not the AHJ. If the AHJ is the applicant, then the AHJ will be the applicant and comply with this section. If the applicant is a developer, then the burden is on the applicant to advocate for such change.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Tue Oct 29 15:54:23 EDT 2013



Public Input No. 5-NFPA 1141-2013 [Section No. 1.3.5.2]

1.3.5.2

One or more published public announcements shall be made of one or more public hearings where the AHJ presents the proposed areas of adoption, ~~outlines hazard profiles~~ outlines proposed methods to comply with this standard using best applicable data, and allows testimony by the public.

Statement of Problem and Substantiation for Public Input

The term “hazard profiles” is undefined in the standard. Therefore, is it very unclear what would be in a “hazard profiles” presentation. The real goal of the presentation should be for the applicant to demonstrate compliance with the major objectives of this standard.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

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Submittal Date: Tue Oct 29 15:56:40 EDT 2013



Public Input No. 6-NFPA 1141-2013 [Section No. 1.3.5.3]

1.3.5.3

~~The AHJ shall make a final written determination regarding the~~ The applicant for a land use or land development change shall make a written proposal to the AHJ regarding the level to which this standard shall be imposed, including justifications that demonstrate need compliance, fire service impact, and responses to the public testimony.

1.3.5.4 The AHJ shall review the applicant's land use or land development change submittal and public testimony and render a written final determination if the proposed land use or land development change complies with this standard.

Statement of Problem and Substantiation for Public Input

The burden to advocate for a land use or land development change rest with the applicant. The role of the AHJ is to review the application for such change to determine if the change is consistent with this standard and then to finally rule on the application. Need justification, compliance with this standard, proposals for fire service compliance and initial responses to public concerns are all items that should be addressed in the applicants proposal for the change. The AHJ then takes on the role of reviewer. If the applicant's proposal is insufficient, then the AHJ rules as such.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Tue Oct 29 15:57:53 EDT 2013



Public Input No. 7-NFPA 1141-2013 [Section No. 1.3.6 [Excluding any Sub-Sections]]

Any person shall be permitted to appeal a decision of the AHJ involving the process utilized for the adoption of a land use or land development change . A process for appeal shall be made available to the public by the appropriate administrative body of the local adopting authority.

Statement of Problem and Substantiation for Public Input

It is somewhat unclear what the TC was intending by the creation of an "Adoption Appeals" and an "Other Appeals" section. However, it appears that the 1.3.6.1 language was intended to address appeals to the adoption process itself, not the technical provisions contained in the approval or denial. If this is the case, this proposed change clarifies that intent.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

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Submittal Date: Wed Oct 30 13:26:18 EDT 2013



Public Input No. 9-NFPA 1141-2013 [New Section after 1.3.6.2]

1.3.6.3 The appeals body shall not have the authority to waive the requirements of this standard.

Statement of Problem and Substantiation for Public Input

This is similar language to that which is contained in NFPA 1 section 1.10.3.4. Technical appeals or other appeals must be confined to the provisions of 1.3.7. This change clarifies that appeals process is not a route to waive the requirements of this standard.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

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Submittal Date: Wed Oct 30 13:29:01 EDT 2013



Public Input No. 8-NFPA 1141-2013 [Section No. 1.3.6.2]

1.3.6.2 Other Appeals.

Appeals of individual technical requirements shall be permitted when it is claimed that any one or more of the following conditions exist:

- (1) The true intent of the requirements described in this standard has been incorrectly interpreted.
- (2) The provisions of the standard do not fully apply.
- (3) A decision is unreasonable or arbitrary as it applies to alternatives or new materials.

Statement of Problem and Substantiation for Public Input

This comment is a correlation comment with the one to section 1.3.6.1. This clarifies the difference between the committee's intent in differentiating an "Adoption Appeal" and an "Other Appeal" process.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Wed Oct 30 13:27:59 EDT 2013



Public Input No. 10-NFPA 1141-2013 [Section No. 1.3.7]

1.3.7 Impact Assessment.

The AHJ- The applicant for a proposed land development or change of land use shall conduct an impact assessment of the proposed land development or change in land use to determine the extent of impact on fire services currently available, as specified in Chapter 11 of this standard. The applicant shall submit the Impact Assessment to the AHJ prior to the public hearings specified in section 1.3.5.2.

1.3.7.1 The AHJ shall review and comment on the Impact Assessment proposed by the applicant. The AHJ shall make their review comments available to the public prior to the public hearing specified in section 1.3.5.2.

Statement of Problem and Substantiation for Public Input

The burden of completing an impact assessment should rest with the applicant for the land use or land development change. The AHJ's role is to review for compliance with the standard and comment on issues of concern in the applicant's impact assessment. This information should be part of the public hearing process.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Wed Oct 30 13:30:12 EDT 2013



Public Input No. 31-NFPA 1141-2014 [Section No. 3.3.5]

3.3.5 Combustible.

Capable of reacting with oxygen and burning if ignited.

A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn; a material that does not meet the definition of noncombustible or limited-combustible. [NFPA 5000]

Statement of Problem and Substantiation for Public Input

This creates consistency in definitions by extracting the definition from NFPA 5000.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 29-NFPA 1141-2014 [Section No. 3.3.24]	

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler

Organization: GBH International

Street Address:

City:

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Zip:

Submittal Date: Fri Jul 04 17:15:59 EDT 2014



Public Input No. 18-NFPA 1141-2013 [New Section after 3.3.18]

3.3.20 Infrastructure. Facilities, services and installations necessary to provide fire protection within the community.

A.3.3.20 Infrastructure includes but is not limited to: fire stations, equipment, staffing, roadways and water supplies.

Statement of Problem and Substantiation for Public Input

The term is utilized in the document title and throughout the document but is undefined. If the TC has a better definition, we would be open to it.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

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City:

State:

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Submittal Date: Wed Oct 30 13:44:14 EDT 2013



Public Input No. 29-NFPA 1141-2014 [Section No. 3.3.24]

3.3.24 Noncombustible -

Not capable of igniting and burning when subjected to a fire.
material. (see 4.2).

Statement of Problem and Substantiation for Public Input

This public input makes NFPA 1141 consistent with other NFPA codes and standards, especially NFPA 5000 (and NFPA 101), which contain the requirements for noncombustible materials in the body of the standard and not in a definition, which is not enforceable.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 30-NFPA 1141-2014 [Chapter 4]	
Public Input No. 31-NFPA 1141-2014 [Section No. 3.3.5]	

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
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Submittal Date: Fri Jul 04 17:07:54 EDT 2014



Public Input No. 30-NFPA 1141-2014 [Chapter 4]

Chapter 4 General Requirements

4.1 General.

As a minimum, the AHJ shall require preliminary, working, and as-built plans to be submitted in a timely manner.

4.1.1

Plans shall be limited to the provisions of this standard.

4.1.1.1

The AHJ shall be permitted to require the review by an approved independent third party with expertise in the matter to be reviewed at the developer's expense.

4.1.1.2

The independent reviewer shall provide an evaluation and recommend necessary changes to the proposed plan development.

4.1.1.3

The AHJ shall be authorized to require design submittals to bear the stamp of a registered design professional.

4.1.1.4

Review and approval by the AHJ shall not relieve the applicant of the responsibility of compliance with this standard.

4.2* Noncombustible material [NFPA 5000, 2015]

4.2.1 A material that complies with any one of the following shall be considered a noncombustible material:

(1)*The material, in the form in which it is used, and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat

(2) The material is reported as passing ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace

at 750 Degrees C

(3) The material is reported as complying with the pass/fail criteria of ASTM E 136 when tested in accordance with the test method and procedure in ASTM E 2652, Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C [NFPA 5000-2015]

A.4.2 The provisions of 4.1 do not require inherently noncombustible materials to be tested in order to be classified as noncombustible materials. [NFPA 5000, 2015]

A.4.2.1(1) Examples of such materials include steel, concrete, masonry and glass. [NFPA 5000, 2015]

Also add ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace (2012) and ASTM E2652, Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C (2012) into chapter 2 on referenced standards.

Statement of Problem and Substantiation for Public Input

This creates consistency with other NFPA documents (especially NFPA 101 and 5000) on the definition of noncombustible material.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 29-NFPA 1141-2014 [Section No. 3.3.24]	

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
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Submittal Date: Fri Jul 04 17:10:50 EDT 2014



Public Input No. 19-NFPA 1141-2013 [Section No. 4.1 [Excluding any Sub-Sections]]

As a minimum, the AHJ ~~shall require~~ developer, contractor or owner shall provide preliminary, working, and as-built plans to ~~be submitted~~ the AHJ in a timely manner.

Statement of Problem and Substantiation for Public Input

The current lanuage places the burden on the AHJ to require. However, it places no burden on the developer, owner or contractor to provide. The responsibility is on the owner, developer or contractor to provide. Under the current lanuage, the AHJ has nothing to enforce on a third party to acquire the requested documents.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

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Submittal Date: Mon Dec 30 13:25:22 EST 2013



Public Input No. 12-NFPA 1141-2013 [Section No. 4.1.1 [Excluding any Sub-Sections]]

Plans shall be ~~limited to the provisions of~~ sufficiently detailed to show compliance with this standard and the referenced documents .

Statement of Problem and Substantiation for Public Input

The current language limits the contents of what should be on the plans. It is questionable as to why that should be the case. If a civil engineer want to provide more information, that will assist in the review. The key for this section should be that plans are sufficient to show compliance with this standard and the referenced documents. The language has been revised to address this need.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

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Submittal Date: Wed Oct 30 13:34:38 EDT 2013



Public Input No. 20-NFPA 1141-2013 [Section No. 4.1.1 [Excluding any Sub-Sections]]

Plans shall be ~~limited to the~~ provided in accordance with the provisions of this standard.

Statement of Problem and Substantiation for Public Input

The intent of the current text appears to limit the ability of the applicant to provide more information than what the standard requires. Why an AHJ would want to restrict an applicant or deny a permit application because too much information is provide is highly questionable. The key should be to mandate that plans are provided in accordance with the standard.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

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Submittal Date: Mon Dec 30 13:29:27 EST 2013



Public Input No. 1-NFPA 1141-2013 [Section No. 5.2.3 [Excluding any Sub-Sections]]

Roadways shall have a minimum clear width of ~~12~~ of 20 ft (3.7 m) for each lane of travel, excluding shoulders and parking.

Statement of Problem and Substantiation for Public Input

Stating a 12 ft minimum for each lane of travel leaves the possibility of a one-way road of 12 ft. Section 5.3 states 16 ft and 24 ft (two-way) minimums based on "traveled way". IFC and NFPA 1 both states a minimum road width of 20 ft as well.

Submitter Information Verification

Submitter Full Name: Doug Hohbein

Organization: Northcentral Fire Code Develop

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City:

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Submittal Date: Tue Oct 15 16:56:09 EDT 2013



Public Input No. 13-NFPA 1141-2013 [New Section after 5.2.18.5]

5.2.18.6 Where required by the AHJ, signs shall also include references to suite numbers pertinent to the roadway utilized to the development.

Statement of Problem and Substantiation for Public Input

The current provisions of 5.2 don't appear to address the specific issue of suite numbers. The proposed language provides guidance on the issue. Suite numbers are not necessarily part of the local addressing system so specific language should be provided.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

Street Address:

City:

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Submittal Date: Wed Oct 30 13:36:36 EDT 2013



Public Input No. 2-NFPA 1141-2013 [Section No. 5.3.6 [Excluding any Sub-Sections]]

Fire lanes intended for one-way travel shall provide a minimum of ~~16~~ of 20 ft (5 m) in width of traveled way.
Fire lanes providing two-way travel shall be a minimum of 24 ft (7.3 m) in width of traveled way.

Statement of Problem and Substantiation for Public Input

“Traveled way” is referenced as determination for fire lane width but is not defined in document. Inference is that traveled way is relative to either one or two way traffic. Section 5.3.6.2 references not allowing drainage to be included in width; this may relate to traveled way as well; some fire lanes may not have curb, gutter, etc.

Submitter Information Verification

Submitter Full Name: Doug Hohbein

Organization: Northcentral Fire Code Develop

Street Address:

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Submittal Date: Tue Oct 15 16:57:30 EDT 2013



Public Input No. 14-NFPA 1141-2013 [Section No. 6.1.1.1]

6.1.1.1

The requirements of 6.1.1 shall be permitted to be extended to ~~300-~~ 450 ft (94- ~~137~~ m) for any building protected by an automatic sprinkler system installed and maintained according to NFPA 13, *Standard for the Installation of Sprinkler Systems*, or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*, whichever is applicable.

Statement of Problem and Substantiation for Public Input

NFPA 1 section 18.2.3.2.2.1 provides for a 450 allowance with fire sprinkler protection. It is unclear and with no technical substantiation as to why NFPA 1411 would require a more restrictive provision than that contained in NFPA 1.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Wed Oct 30 13:37:39 EDT 2013



Public Input No. 22-NFPA 1141-2013 [Section No. 7.2.1]

7.2.1 Standpipe Systems.

7.2.1.1 General.

The design and installation of standpipe systems shall be in accordance with this section and NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*. [1:13.21]

7.2.1.2

Where municipal-type water systems are available, the requirements of 7.2.1.1 and 7.2.1.4 shall apply to all new buildings where any of the following conditions exist:

- (1) More than three stories above grade
- (2) More than 50 ft (15 m) above grade and containing intermediate stories or balconies
- (3) More than one story below grade
- (4) More than 20 ft (6.1 m) below grade

7.2.1.2.1

High-rise buildings shall be protected throughout by a Class I standpipe system in accordance with 7.2.1.1 and 7.2.1.4. [1:13.2.2.3]

7.2.1.2.2

The provisions of this section shall not apply to one- and two-family dwellings.

7.2.1.3

Where municipal-type water systems are not available, the requirements of 7.2.1.3 and 7.2.1.5 shall apply to all new buildings where any of the following conditions exist:

- (1) More than two stories in height above grade
- (2) More than 40 ft (12.2 m) above grade and containing intermediate stories or balconies
- (3) More than one story below grade
- (4) More than 20 ft (6.1 m) below grade

7.2.1.3.1

High-rise buildings shall be protected throughout by a Class I standpipe system in accordance with 7.2.1.1 and 7.2.1.5. [1:13.2.2.3]

7.2.1.3.2

The provisions of this section shall not apply to one- and two-family dwellings.

7.2.1.4 * _

Fire department connections for standpipe systems shall be located not more than 100 ft (30.5 m) from the nearest fire hydrant connected to an approved water supply.

7.2.1.4.1

The location of the fire department connections shall be permitted to exceed 100 ft (30.5 m) subject to the approval of the AHJ.

7.2.1.4.2

Fire department connections shall be located not less than 18 in. (457 mm) nor more than 48 in. (1219 mm) above the level of the adjoining ground, sidewalk, or grade surface.

7.2.1.4.3

Fire department connections shall be arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects, including buildings, fences, posts, or other fire department connections.

7.2.1.5

Fire department connections shall be located to facilitate the establishment of a continuous supplemental water supply where municipal-type water systems are not available and shall be arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects, including buildings, signs, fences, posts, or other fire department connections.

Statement of Problem and Substantiation for Public Input

The modifier exempting one and two family dwellings in 7.2.1.3 should also exist in 7.2.1.2. Placing a standpipe in a one and two family dwelling, even if there is a municipal type water system in place, is onerous.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

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Submittal Date: Mon Dec 30 13:43:45 EST 2013



Public Input No. 15-NFPA 1141-2013 [Section No. 7.3]

7.3 – Automatic Fire Warning Systems.

7.3.1 –

Any residential buildings containing more than two living units shall have a local fire alarm system designed and installed in accordance with *NFPA 72*, *National Fire Alarm and Signaling Code*.

7.3.2 –

In any residential buildings containing four or more living units, the local fire alarm system shall retransmit to an approved central station.

7.3.3 –

For nonresidential structures exceeding 1000 ft² (93 m²) gross floor area, an approved fire warning or alarm system shall be installed in accordance with *NFPA 72*, *National Fire Alarm and Signaling Code*.

7.3.3.1 –

For nonresidential structures exceeding 5000 ft² (465 m²) gross floor area, such systems shall retransmit an alarm to an approved central station.

7.3.3.2 –

Alarms or warning systems shall be tested and maintained in accordance with *NFPA 72*, *National Fire Alarm and Signaling Code*.

Statement of Problem and Substantiation for Public Input

There is no technical justification to provide more stringent thresholds for automatic fire warning systems in rural and suburban environment than is already provided in NFPA 101, NFPA 5000 or the ICC documents.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

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Submittal Date: Wed Oct 30 13:40:15 EDT 2013



Public Input No. 21-NFPA 1141-2013 [Section No. 7.3]

7.3 – Automatic Fire Warning Systems.

7.3.1 –

Any residential buildings containing more than two living units shall have a local fire alarm system designed and installed in accordance with *NFPA 72*, *National Fire Alarm and Signaling Code*.

7.3.2 –

In any residential buildings containing four or more living units, the local fire alarm system shall retransmit to an approved central station.

7.3.3 –

For nonresidential structures exceeding 1000 ft² (93 m²) gross floor area, an approved fire warning or alarm system shall be installed in accordance with *NFPA 72*, *National Fire Alarm and Signaling Code*.

7.3.3.1 –

For nonresidential structures exceeding 5000 ft² (465 m²) gross floor area, such systems shall retransmit an alarm to an approved central station.

7.3.3.2 –

Alarms or warning systems shall be tested and maintained in accordance with *NFPA 72*, *National Fire Alarm and Signaling Code*.

Statement of Problem and Substantiation for Public Input

There is no technical justification that fire alarm systems need to be provided in structures of this size without consideration for occupancy. If the TC wants to have a fire alarm system threshold, that threshold should be derived from the provisions of NFPA 101 Life Safety Code.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

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Submission Date: Mon Dec 30 13:40:21 EST 2013



Public Input No. 23-NFPA 1141-2013 [Section No. 8.1.1]

8.1.1

Where water mains or fire hydrants are provided for fire protection purposes, the following shall apply:

- (1) ~~They shall~~ Water mains installed on public property or in a utility easement shall be installed and maintained in accordance with AWWA Manual 31, *Distribution System Requirements for Fire Protection*, ~~where on public property.~~
They
- (2) .
- (3) Water mains installed on nonpublic property shall be installed and maintained in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, ~~where on nonpublic property.~~

Statement of Problem and Substantiation for Public Input

This section was:

1. Revised for better readability placing the condition dictating the standard at the beginning of the sentence and;
2. Added the utility easement modifier. Frequently, public mains are placed on/in utility easements on private property. In these situations, the M31 would be the appropriate standard for installation.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

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Submittal Date: Mon Dec 30 13:48:25 EST 2013



Public Input No. 16-NFPA 1141-2013 [New Section after 11.1.2]

11.1.3 Where the fire department provides emergency medical services, the assessments specified in items (1)-(3) contained in section 11.1.2 shall be applied to the emergency medical service delivery in addition to the fire protection service delivery.

Statement of Problem and Substantiation for Public Input

Many fire departments also provide EMS services and the impact of new development can have a much greater impact on EMS than fire protection. The new section above clarifies that the assessment should apply to EMS services when such services are provided by the FD. In lieu of this change, the TC could provide a new definition for "Fire Protection Services" in chapter 3 and include EMS in the definition.

Submitter Information Verification

Submitter Full Name: Bill Galloway
Organization: Southern Regional Fire Code De
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Submittal Date: Wed Oct 30 13:41:43 EDT 2013



Public Input No. 17-NFPA 1141-2013 [New Section after 11.2]

11.3 The assessment shall be completed and mitigation approaches agreed to prior to the public hearing specified in section 1.3.5.2 .

Statement of Problem and Substantiation for Public Input

The assessment and mitigation approaches are key components in determining if the land use change should be approved. In order to conduct an evaluation of the final approval, the AHJ and/or governing body needs to know about the impact prior to the public hearing and final land use change approval.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

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Submittal Date: Wed Oct 30 13:42:54 EDT 2013



Public Input No. 27-NFPA 1141-2014 [Section No. B.1.2.1]

B.1.2.1 AWWA Publications.

American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235.

AWWA Manual 31 - **M31** , *Distribution System Requirements for Fire Protection*, - 1998 - **4th edition, 2008** .

Statement of Problem and Substantiation for Public Input

Updated title and edition year.

Submitter Information Verification

Submitter Full Name: Aaron Adamczyk

Organization: [Not Specified]

Street Address:

City:

State:

Zip:

Submittal Date: Mon Jun 09 01:24:47 EDT 2014



Public Input No. 28-NFPA 1141-2014 [Sections B.2.1, B.2.2, B.2.3]

Sections B.2.1, B.2.2, B.2.3

B.2.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2010 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2008 edition.

NFPA 70[®], *National Electrical Code*[®], 2011 edition.

NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, 2012 edition.

NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*, 2009 edition.

NFPA 101[®], *Life Safety Code*[®], 2012 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, 2010 edition.

NFPA 220, *Standard on Types of Building Construction*, 2012 edition.

NFPA 600, *Standard on Industrial Fire Brigades*, 2010 edition.

NFPA 601, *Standard for Security Services in Fire Loss Prevention*, 2010 edition.

NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2010 edition.

NFPA 1401 Standard on Training for Initial Emergency Scene Operations, 2010 Edition

NFPA 5000[®], Building Construction and Safety Code[®], 2012 edition.

Brannigan, Francis L., *Building Construction for the Fire Service*, 1992 5th edition, 2012.

Fire Protection Handbook, 19th 20th edition, 2003 2008.

Kimball, Warren Y., *Fire Attack I*, 1966.

Kimball, Warren Y., *Fire Attack II*, 1966.

NFPA Fire and Life Safety Inspection Manual, 8th 2012 edition, 2002.

B.2.2 Insurance Services Offices Publications.

Insurance Services Offices, Inc., 545 Washington Blvd., Jersey City, NJ 07310-1686.

Fire Suppression Rating Schedule, 2003 2012.

Guide for Determination of Needed Fire Flow, 2005.

B.2.3 Other Information Sources.

American Institute of Architects Research Corporation, 1735 New York Avenue, Washington, DC 20006.

American Insurance Service Group, 85 John Street, New York, NY 10038.

International City/County Managers' Association, 777 N. Capitol Street, Washington, DC 20002.

International Code Council, 5203 Leesburg Pike, Suite 600, Falls Church, VA 22041-3401

International Fire Marshals Association, c/o NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471.

Statement of Problem and Substantiation for Public Input

Addition of NFPA 1410 to replace Fire Attack 1966 and updated edition years.

Submitter Information Verification

Submitter Full Name: Aaron Adamczyk
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jun 09 01:28:14 EDT 2014

ATTACHMENT B



Public Input No. 10-NFPA 1142-2013 [Section No. 1.1.2]

1.1.2

An adequate and reliable municipal-type water supply is one that is sufficient every day of the year to control and extinguish anticipated fires in the municipality, particular building, or building group served by the water supply that meets the jurisdiction's adopted design and fire flow criteria .

Statement of Problem and Substantiation for Public Input

The wording “control and extinguish..” is an unreasonable performance standard. The fire flow required to “control and extinguish” is highly dependent on the fire growth rate and delay in alarm. There are many situations where a fire will progress beyond the capability of the water system to extinguish a fire. Fire flow formula's establish reasonable fire flow delivery rates based on a risk assessment. Utilizing these fire flow formulas should be the basis to determining if an adequate and reliable delivery system exists. The new annex text references the normally accepted fire flow formulas.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

Street Address:

City:

State:

Zip:

Submittal Date: Wed Oct 30 13:47:28 EDT 2013



Public Input No. 45-NFPA 1142-2013 [Section No. 1.1.2]

1.1.2

An adequate and reliable municipal-type water supply is one that ~~is sufficient every day of the year to control and extinguish anticipated fires in the municipality, particular building, or building group served by the water supply provides the required fire flow from the municipal-type water system in accordance with~~ AWWA M31 Distribution System Requirements for Fire Protection .

Statement of Problem and Substantiation for Public Input

It is unreasonable to expect that a municipal type water system can be "sufficient every day of the year to control and extinguish anticipated fires in the municipality, particular building, or building group." There are many fire scenerios that will exent beyond the capability of the municipal type water system to extinguish a fire even in an well served suburban setting. The inclusion of the M31 standard provides as resaonable set of criteria to evaluate the system to see if it is adaqueate and reliable. The M31 standard is referenced by 1141 and is appropriate as a standard to be reference here.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 14:05:54 EST 2013



Public Input No. 46-NFPA 1142-2013 [Section No. 1.1.2]

1.1.2 –

An adequate

3.X

Adequate and reliable municipal-type water supply- is one that is : A municipal-type water supply that is sufficient every day of the year to control and extinguish anticipated fires in the municipality, particular building, or building group served by the water supply.

Statement of Problem and Substantiation for Public Input

Revise and relocate this section to chapter 3 definitions. As currently written, section 1.1.2 is really a definition in the Scope section. It is more appropriate as a defined term in chapter 3.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 14:16:31 EST 2013



Public Input No. 9-NFPA 1142-2013 [Section No. 1.1.2]

1.1.2

An adequate and reliable municipal-type water supply is one that is sufficient every day of the year to control and extinguish anticipated fires in the municipality jurisdiction , particular building, or building group served by the water supply.

Statement of Problem and Substantiation for Public Input

The term "municipality" is specific to a City. It would not include a county, district or other form of government. Jurisdiction is more encompassing.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

Street Address:

City:

State:

Zip:

Submittal Date: Wed Oct 30 13:46:20 EDT 2013



Public Input No. 31-NFPA 1142-2013 [New Section after 1.3.3]

Retroactivity

1.4 Retroactivity.

The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1

Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.4.2

In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.4.3

The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

Statement of Problem and Substantiation for Public Input

Insert the standard retroactivity provisions from the NFPA Manual of Style. This provides guidance to the AHJ to the proper application of the standard in existing installations.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Thu Nov 21 19:48:25 EST 2013



Public Input No. 32-NFPA 1142-2013 [New Section after 1.4]

1.6 Units and Formulas

(Insert the standard "Units and Formulas" language from the NFPA Manual of Style.)

Statement of Problem and Substantiation for Public Input

Insert the standard Units and Formulas language from the NFPA Manual of Style. This will include units, symbols and conversion factors to address the metric units.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Thu Nov 21 20:17:34 EST 2013



Public Input No. 56-NFPA 1142-2014 [Chapter 2]

Chapter 2 Referenced Publications

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2010-edition 2013 .

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 2010-edition 2013 .

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*, 2010-edition 2013 .

NFPA 220, *Standard on Types of Building Construction*, 2012- edition .

NFPA 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*, 2006-edition 2012 .

NFPA 1963, *Standard for Fire Hose Connections*, 2009-edition 2014 .

2.3 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 1, *Fire Code* , 2012-edition 2015 .

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 2010-edition 2013 .

NFPA 101[®], *Life Safety Code*[®], 2012-edition 2015 .

NFPA 1141, *Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas*, 2012- edition .

NFPA 1600[®], *Standard on Disaster/Emergency Management and Business Continuity Programs*, 2010-edition 2013 .

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2009 edition.

NFPA 1911, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus*, 2007-edition 2012 .

NFPA 1925, *Standard on Marine Fire-Fighting Vessels*, 2008-edition 2013 .

NFPA 1961, *Standard on Fire Hose*, 2007-edition 2013 .

NFPA 5000[®], *Building Construction and Safety Code*[®], 2012- edition .

Statement of Problem and Substantiation for Public Input

Updated to current editions.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 57-NFPA 1142-2014 [Chapter J]	

Submitter Information Verification

Submitter Full Name: Aaron Adamczyk
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jun 10 00:22:08 EDT 2014



Public Input No. 16-NFPA 1142-2013 [New Section after 4.1.1.1]

4.1.1.1.1 The plans shall specify how the minimum required water supply is being provided including all alternative water supply sources and their design specifications.

4.1.1.1.2 Construction shall not commence until the AHJ has approved the alternative water supply design.

Statement of Problem and Substantiation for Public Input

The current language in 4.1.1.1 only specifies that plans shall be submitted to the AHJ in order to calculate the required water supply. However, the current language does not address the need for the AHJ to see how the alternative water supply is intended to be provided. This is just as important, if not more important, than the initial calculation. In addition, construction should not proceed until there is an approved design to meet the requirements of this standard.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

Street Address:

City:

State:

Zip:

Submittal Date: Wed Oct 30 14:01:04 EDT 2013



Public Input No. 47-NFPA 1142-2013 [New Section after 4.1.1.1]

4.1.1.1.1 The property owner shall be responsible for submitting to the AHJ how the minimum water supply shall be provided prior to the approval of new construction.

Statement of Problem and Substantiation for Public Input

The current 4.1.1.1 indicates that the property owner is responsible for submitting plans so the minimum water supply can be calculated. However, there is no requirement that the property owner provide any documentation as to how the minimum water supply will be provided. This should be a basic submittal requirement to the AHJ so that that AHJ can review and approve the method of supply prior to new construction.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

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Submittal Date: Mon Dec 30 14:31:54 EST 2013



Public Input No. 48-NFPA 1142-2013 [New Section after 4.1.1.1]

4.1.1.1.1 The minimum water supply shall be available prior to combustibles being brought on-site.

Statement of Problem and Substantiation for Public Input

This PI addresses the timing of the availability of the water supply. The water supply should be available on-site when the potential need for a fire protection water supply exists. This is usually at the time of construction activity beginning and combustibles being brought on-site.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 14:32:56 EST 2013



Public Input No. 49-NFPA 1142-2013 [New Section after 4.1.1.2]

4.1.1.2.1 The property owner shall be responsible for submitting to the AHJ how the minimum water supply shall be provided prior to the AHJ approving the structural, design or occupancy change of an existing building.

Statement of Problem and Substantiation for Public Input

As similar to the PI proposing new language to 4.1.1.1.1, the property owner should be responsible to submitting a proposed approach to the AHJ indicating how the water supply will be provided. This should occur prior to the change that the property owner is contemplating.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 14:35:50 EST 2013



Public Input No. 50-NFPA 1142-2013 [New Section after 4.1.1.2]

4.1.1.2.1 The minimum water supply shall be available prior to the structural, design or occupancy change of an existing building.

Statement of Problem and Substantiation for Public Input

As in the PI to 4.1.1.1.1, the water supply should be available on site prior to the change being implemented that is proposed by the property owner. The owner should ensure those improvements, if any, are in place prior to on-site hazard increase occurring.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 14:38:14 EST 2013



Public Input No. 13-NFPA 1142-2013 [New Section after 4.1.4]

4.1.5 The AHJ shall be permitted to specify the rate that the required water supply shall be delivered from the alternative water sources.

Statement of Problem and Substantiation for Public Input

Section 4.6 appears to provide a specification that requires the Fire Department to perform with respect to the rate of water supply delivery. However, there appears to be no language in the standard that addresses the minimum performance for rate of delivery for alternative water supply sources. As an example, it would make no sense for the standard to require 200,000 gallons of stored water but the ability to utilize that water supply source was only limited to 250GPM. This proposed language clarifies that the AHJ can specify the rate of delivery of the water supply source.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

Street Address:

City:

State:

Zip:

Submittal Date: Wed Oct 30 13:53:15 EDT 2013



Public Input No. 11-NFPA 1142-2013 [Section No. 4.6.1]

4.6.1

The fire department shall develop the capability to deliver the amount of water determined in accordance with Sections 4.2 through 4.5 to the incident scene at the rate shown in [Table 4.6.1](#).

Table 4.6.1 Minimum Capability of Fire Department to Deliver Water

<u>Total Water Supply Required</u>		<u>Rate Water Is Available at the Incident</u>	
<u>gal</u>	<u>L</u>	<u>gpm</u>	<u>L/min</u>
<u><2,500</u>	<u>9,459</u>	<u>250</u>	<u>950</u>
<u>2,500–9,999</u>	<u>9,460–37,849</u>	<u>500</u>	<u>1,900</u>
<u>10,000–19,999</u>	<u>37,850–75,699</u>	<u>750</u>	<u>2,850</u>
<u>≥20,000</u>	<u>≥75,700</u>	<u>1,000</u>	<u>3,800</u>

Revise table 4.6.1 to provide for “Rate Water Is Available at the Incident” with increments greater than 1,000 GPM. Example...1,500, 2,000, etc.

Statement of Problem and Substantiation for Public Input

Table 4.6.1 currently tops out at $\geq 20,000$ gallons and 1,000 gpm. There are numerous situations where the “Total Water Supply Required” will vastly exceed the 20,000 gallon mark and move into 50,000, 100,000 or even 200,000 gallons of water required. These greater demands in available water should also translate into greater rates of water delivery escalating with the table. If the water cannot be delivered at a rate needed to check the fire growth rate, the volume of water available become immaterial.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

Street Address:

City:

State:

Zip:

Submittal Date: Wed Oct 30 13:49:55 EDT 2013



Public Input No. 12-NFPA 1142-2013 [Section No. 4.6.1]

4.6.1

The fire department shall develop the capability to deliver the amount of water determined in accordance with Sections 4.2 through 4.5 to the incident scene at the rate shown in [Table 4.6.1](#).

Table 4.6.1 Minimum Capability of Fire Department to Deliver Water

<u>Total Water Supply Required</u>		<u>Rate Water Is Available at the Incident</u>	
<u>gal</u>	<u>L</u>	<u>gpm</u>	<u>L/min</u>
<u><2,500</u>	<u>9,459</u>	<u>250</u>	<u>950</u>
<u>2,500–9,999</u>	<u>9,460–37,849</u>	<u>500</u>	<u>1,900</u>
<u>10,000–19,999</u>	<u>37,850–75,699</u>	<u>750</u>	<u>2,850</u>
<u>≥20,000</u>	<u>≥75,700</u>	<u>1,000</u>	<u>3,800</u>

Reconcile the language in 1.3.1 and the Table 4.6.1. These two sections appear to provide conflicting direction.

Statement of Problem and Substantiation for Public Input

Section 1.3.1 states that the standard is not intended to address fireground operational procedures. However, Table 4.6.1 specifically creates a fireground operational constraint on the FD with a minimum capability of the fire department to deliver water. These two sections appear to conflict in both addressing a fireground operational expectation/procedure.

Submitter Information Verification

Submitter Full Name: Bill Galloway

Organization: Southern Regional Fire Code De

Street Address:

City:

State:

Zip:

Submittal Date: Wed Oct 30 13:51:30 EDT 2013



Public Input No. 43-NFPA 1142-2013 [Section No. 4.6.1]

4.6.1

The fire department shall develop the capability to deliver the alternative water supply shall be capable of supplying the amount of water determined in accordance with Sections 4.2 through 4.5 to at the incident scene at the rate shown in Table 4.6.1.

Table 4.6.1 Minimum Capability of Fire Department- Alternative Water Supply to Deliver Water

<u>Total Water Supply Required</u>		<u>Rate Water Is Available at the Incident</u>	
<u>gal</u>	<u>L</u>	<u>gpm</u>	<u>L/min</u>
<2,500	9,459	250	950
2,500–9,999	9,460–37,849	500	1,900
10,000–19,999	37,850–75,699	750	2,850
≥20,000	≥75,700	1,000	3,800

Statement of Problem and Substantiation for Public Input

The current lanauge in 4.6.1 appears to conflict with section 1.3.1. Section 1.3.1 states that the standard does not address firegorund operational procedures such as rate of water application. However, section 4.6.1 has a specic mandate on the Fire Department to deliver water. This is clearly an operational proceederal issues. In addition, the true intent of 4.6.1 should be to require a water supply rate at the fireground. How and who developes that water supply is not maerial as long as it is in accordance with the standard.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 11:11:16 EST 2013



Public Input No. 44-NFPA 1142-2013 [Section No. 4.6.1]

4.6.1

The fire department shall develop the capability to deliver the amount of water determined in accordance with Sections 4.2 through 4.5 to the incident scene at the rate shown in [Table 4.6.1](#).

Table 4.6.1 Minimum Capability of Fire Department to Deliver Water

<u>Total Water Supply Required</u>		<u>Rate Water Is Available at the Incident</u>	
<u>gal</u>	<u>L</u>	<u>gpm</u>	<u>L/min</u>
<u><2,500</u>	<u>9,459</u>	<u>250</u>	<u>950</u>
<u>2,500–9,999</u>	<u>9,460–37,849</u>	<u>500</u>	<u>1,900</u>
<u>10,000–19,999</u>	<u>37,850–75,699</u>	<u>750</u>	<u>2,850</u>
<u>≥20</u>			
		<u>20,000 -29,999</u>	
<u>≥75,700</u>	<u>1,000 3,800</u>		
		<u>75,700-113,559</u>	<u>1,000</u>
<u>30,000-39,999</u>		<u>113,560-151,412</u>	<u>1,250</u>
<u>40,000-49,999</u>		<u>151,413-189,270</u>	<u>1,500</u>
<u>50,000-59,999</u>		<u>189,271-227,120</u>	<u>1,750</u>
<u>≥60,000</u>		<u>≥227,121</u>	<u>2,000</u>
			<u>3,800</u>
			<u>4,732</u>
			<u>5,678</u>
			<u>6,624</u>
			<u>7,570</u>

Statement of Problem and Substantiation for Public Input

Table 2.6.1 currently caps at 1,000 gpm. Rates of delivery greater than 1,000 gpm should be provided when the total water supply increases above the 20,000 gallon demand. The PI proposes to add additional 250 GPM increments up to the 2,000 GPM level using the same steps currently in the Total Water Supply Required column. There are many fire scenarios where delivery rates greater than 1,000 GPM are necessary and should be taken into consideration by the standard.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submission Date: Mon Dec 30 11:29:16 EST 2013



Public Input No. 52-NFPA 1142-2013 [New Section after 7.1.2]

7.1.3 Water Storage Tanks shall be inspected, tested and maintained in accordance with NFPA 25, Standard for Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.

Statement of Problem and Substantiation for Public Input

It is possible that some of the alternative water supplies shall be provided via water storage tanks. Those water storage tanks should be inspected, tested and maintained in accordance with the applicable NFPA standard.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 15:29:34 EST 2013



Public Input No. 51-NFPA 1142-2013 [Section No. 7.1.3]

7.1.3

In locations where adequate municipal-type water systems are not provided- ~~and additional fire protection is needed~~ , minimum water supplies shall be established in, or transportable to, the designated area.

Statement of Problem and Substantiation for Public Input

The current language is somewhat questionable as to intent. It appear that the "and where additional fire protection is needed" is unnecessary. The 1142 standard itself establishes when fire protection water supply is necessary and should be provided. The current language appears to infer that this is an AHJ determination. Deleting this text will bring clarity to the provision.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Mon Dec 30 15:11:12 EST 2013



Public Input No. 30-NFPA 1142-2013 [New Section after 7.1.5]

7.1.5.1 The AHJ is authorized to require certification of compliance with 7.1.5 by a Civil Engineer.

Statement of Problem and Substantiation for Public Input

In many cases, the AHJ will not know if the 50 year drought requirement is complied with by the AHJ assessing the site. A civil engineer will most likely be required to provide that type of evaluation.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Thu Nov 21 19:31:14 EST 2013



Public Input No. 29-NFPA 1142-2013 [Section No. 7.4]

7.4 ~~Fire Department~~ Water Supply Hose Connections.

Any fitting provided at a water source to permit a fire apparatus to connect to the water source shall be approved by the AHJ and shall conform to NFPA 1963, *Standard for Fire Hose Connections*.

Statement of Problem and Substantiation for Public Input

The title revision better reflects the intent of the section. The existing title "Fire Department Connections" infers to the user an FDC supplying a fire sprinkler system or standpipe system. In addition, section 3.8.1.4 of NFPA 13 defines Fire Department Connection as a connection which the "...fire department can pump supplemental water into the sprinkler system...."

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

City:

State:

Zip:

Submittal Date: Thu Nov 21 19:13:42 EST 2013



Public Input No. 17-NFPA 1142-2013 [Section No. 7.5]

7.5 * _ Access to Water Sources.

Roads providing a means of access to any required water supply shall be constructed and maintained in accordance with the following:

- (1) Roadways shall have a minimum clear width of 12 ft (3.7 m) for each lane of travel.
- (2) Turns shall be constructed with a minimum radius of 100 ft (30.5 m) to the centerline.
- (3) The maximum sustained grade shall not exceed a slope of 1-inch in 1-foot (8 percent) .
- (4) All cut-and-fill slopes shall be stable for the soil involved.
- (5) Bridges, culverts, or grade dips shall be provided at all drainageway crossings; roadside ditches shall be deep enough to provide drainage with special drainage facilities (tile, etc.) at all seep areas and high water-table areas.
- (6) The surface shall be treated as required for year-round travel.
- (7) Erosion control measures shall be used as needed to protect road ditches, cross drains, and cut-and-fill slopes.
- (8) * Where turnarounds are utilized during fire-fighting operations, they shall be designed with a diameter of 120 ft (36.5 m) or larger, as required, to accommodate the equipment of the responding fire department.
- (9) Load-carrying capacity shall be adequate to carry the maximum vehicle load expected.
- (10) The road shall be suitable for all-weather use.
- (11) When a bridge is required to be used as part of a fire department access road, it shall be constructed and maintained in accordance with nationally recognized standards. [1:18.2.3.4.5.1]
- (12) The bridge shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. [1:18.2.3.4.5.2]
- (13) Vehicle load limits shall be posted at both entrances to bridges where required by the AHJ. [1:18.2.3.4.5.3]

Statement of Problem and Substantiation for Public Input

Slope is more conventionally expressed in the number of inches of rise (or drop) per foot of run.

Submitter Information Verification

Submitter Full Name: John Chartier
Organization: Northeastern Regional Fire Cod
Street Address:
City:
State:
Zip:
Submission Date: Fri Nov 08 08:01:58 EST 2013



Public Input No. 40-NFPA 1142-2013 [Section No. 8.3]

8.3* Dry Hydrant Design- and Location .

8.3.1*

The AHJ shall approve all aspects of the dry hydrant design and construction, including the type of materials, pipe size, and system fittings to be used.

8.3.2*

As a minimum, Schedule 40 pipe and component fittings shall be used.

8.3.3*

All dry hydrant systems shall be designed and constructed to provide a minimum flow of 1000 gpm (3800 L/min) at draft.

8.3.4*

The water supply source for the dry hydrant shall provide, on a year-round basis, the required quantity of water, as determined in Chapter 4, and the minimum flow as required in [8.3.3](#).

8.3.5*

Dry hydrant systems shall be designed and constructed so that slope and piping configurations do not impede drafting capability.

8.3.6*

All exposed surfaces and all underground metal surfaces shall be protected to prevent deterioration.

8.3.7*

A minimum number of elbows shall be used in the piping system.

8.3.8

Suction hose connection(s) shall be compatible with the fire department's hard suction hose size and shall conform to NFPA 1963, *Standard for Fire Hose Connections*. The connection(s) shall include a protective cap. The cap and adapter shall be of materials that minimize rust and galvanic corrosion.

8.3.9

Dry hydrant system piping shall be supported and/or stabilized using approved engineering design practices.

8.3.10

Stabilization or equivalent protection shall be employed at elbows and other system stress points.

8.3.11

In addition to strength of materials and structural support criteria, design shall specify appropriate aggregates and soil materials to be used to backfill/cover piping during installation.

8.3.12

All connections shall be clean, and the appropriate sealing materials shall be used according to manufacturer's specifications so as to ensure that all joints are airtight.

8.3.13*

System strainers shall be constructed to permit required fire flow.

Statement of Problem and Substantiation for Public Input

The title of sections 8.3 and 8.4 both have the term "location" used in the titles. A review of the content of 8.3 indicates that it is more focused on design rather than location issues. Section 8.4 is more focused on location. Therefore, this PI has proposed to strike "location" from the title of 8.3 as two sections should not have the same title and 8.3 does not contain location specifications.

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Submittal Date: Thu Dec 26 09:59:47 EST 2013



Public Input No. 41-NFPA 1142-2013 [Section No. 8.4.1]

8.4.1

A minimum of 3 ft (0.9144 m) clear, unobstructed space shall be provided around the dry hydrant.

Statement of Problem and Substantiation for Public Input

The current language of "3 ft." is vague and does not specify intent of the distance requirement. The proposed PI adds clarification to the intent of the 3' requirement to ensure no obstructions are placed within the parameters of fire department access.

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Submittal Date: Thu Dec 26 10:08:51 EST 2013



NFPA Public Input No. 42-NFPA 1142-2013 [Section No. 8.4.1]

8.4.1

A minimum of 3 ft (0.9144 m) shall Clearances of seven and one half feet (7' 6") in front of and to the sides of the fire hydrant, with a four feet (4') clearance to the rear of the hydrant shall be provided around the dry hydrant. Exception: These dimensions may be reduced by approval of the fire official.

Statement of Problem and Substantiation for Public Input

The current text in section 8.4.1 does not mirror the language in NFPA 1, chapter 18.3.4.1. This could present design problems as the two code sections conflict. Both codes should have the same clearance dimensions.

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Submittal Date: Sun Dec 29 10:34:51 EST 2013



NFPA Public Input No. 36-NFPA 1142-2013 [Section No. 8.6]

8.6* Installation Procedure for Dry Hydrant System.

8.6.1 The AHJ shall ensure that the installation meets all design criteria.

8.6.2 The dry hydrant system shall be flow tested at full capacity prior to acceptance.

Statement of Problem and Substantiation for Public Input

The proposed PI ensures that dry hydrant systems are tested and operational prior to acceptance by the AHJ. There is currently no requirement in NFPA 1142 for a final acceptance test or inspection by the AHJ. The only inspection and testing requirements are those that are in place once the system is installed.

Submitter Information Verification

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City:

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Submittal Date: Tue Dec 24 14:36:29 EST 2013



Public Input No. 38-NFPA 1142-2013 [Section No. 8.7.3]

8.7.3

~~Grass, brush, and other vegetation shall be kept trimmed and neat.~~ Vegetation shall be cleared for a minimum 3 ft (0.9 m) radius from around hydrants.

Statement of Problem and Substantiation for Public Input

The first sentence in this section provides no value and even appear to conflict with the second. Is it intended to be a modifier outside of the 3 ft clearance requirement of the second sentence? If it is then it should have a specific distance or sight visibility modifier attached to trimming requirement.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

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City:

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Submittal Date: Thu Dec 26 09:43:34 EST 2013



Public Input No. 39-NFPA 1142-2013 [Section No. 8.7.3]

8.7.3

Grass, brush, and other vegetation shall be kept trimmed and neat. Vegetation shall be cleared for a minimum 3 ft (0.9 m) radius from around back and sides of hydrants. Vegetation shall be cleared in front of the hydrant so that it is visible and accessible to responding fire department personnel.

Statement of Problem and Substantiation for Public Input

A 3 ft clearance may not be sufficient in front of a hydrant. If a line of bushes is placed 4 ft in front of a hydrant, it would not be accessible nor visible to responding fire personnel. However,

it would also be in compliance with the current code language. This revision changes the front requirement to be performance based so the FD can both access and see the hydrant.

Submitter Information Verification

Submitter Full Name: Anthony Apfelbeck

Organization: Altamonte Springs Building/Fire Safety Division

Street Address:

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Submittal Date: Thu Dec 26 09:49:09 EST 2013



Public Input No. 18-NFPA 1142-2013 [Section No. 8.7.4]

8.7.4

~~The hydrants shall be marked, as needed, with reflective material to enhance their visibility during emergencies, reflective material marking the hydrant and signage shall be inspected at least annually to verify that it is being maintained in accordance with 8.4.7.~~

Statement of Problem and Substantiation for Public Input

As written, the requirement is redundant to that which appears in 8.4.7. Since section 8.7 addresses inspection and maintenance, the proposed text provides language that more appropriately speaks to inspection and maintenance functions.

Submitter Information Verification

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Submittal Date: Fri Nov 08 08:03:03 EST 2013



Public Input No. 20-NFPA 1142-2013 [Section No. 8.7.6]

8.7.6*

The hydrants shall be flow tested at least annually with ~~a fire department pump to an~~ approved pump to ensure that the minimum design flow is maintained.

Statement of Problem and Substantiation for Public Input

In our area, the fire department does not own or maintain drafting hydrants. As currently worded, section 8.7.6 is easily read as "the fire department shall flow each hydrant annually." This reading puts a burden on the fire department's already limited manpower and possibly exposes fire department apparatus to damage from unmaintained/compromised drafting hydrants. An example would be sucking rocks into the pump on a fire well (this has happened). During a fire, a fire department has to use what is available for a water supply, however it is not acceptable to risk damage to fire department apparatus testing someone else's equipment.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 21-NFPA 1142-2013 [Section No. 8.8]	

Submitter Information Verification

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City:

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Submission Date: Tue Nov 12 11:50:54 EST 2013



Public Input No. 22-NFPA 1142-2013 [New Section after 8.8]

Availability of Records

The owner of the drafting hydrant(s) shall, upon the request of the AHJ, make available for inspection all records required by 8.8

Statement of Problem and Substantiation for Public Input

Since the owner of the drafting hydrants should be responsible for maintaining all records they should be available to the AHJ upon request.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
Public Input No. 21-NFPA 1142-2013 [Section No. 8.8]	clarifies owner responsibility

Submitter Information Verification

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Submittal Date: Tue Nov 12 14:01:38 EST 2013



Public Input No. 21-NFPA 1142-2013 [Section No. 8.8]

8.8* Records for Dry Hydrants.

~~The AHJ~~ The owner shall maintain, in a safe location, maps and records of each dry hydrant installation and the subsequent tests, inspections, maintenance, and repairs to the dry hydrant.

Statement of Problem and Substantiation for Public Input

The onus for maintaining records should be on the owner of the drafting hydrants. Copies of the records should be available to the AHJ upon request.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 20-NFPA 1142-2013 [Section No. 8.7.6]</u>	Both suggestions shift responsibility from the fire department/AHJ to the owner of the drafting hydrants.
<u>Public Input No. 22-NFPA 1142-2013 [New Section after 8.8]</u>	

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Submittal Date: Tue Nov 12 13:54:35 EST 2013



Public Input No. 8-NFPA 1142-2013 [Section No. A.4.4]

A.4.4



~~See NFPA 1, Fire Code, Section 18.4 for information on 4 information below on permitted reductions of fire flow and other fire flow provisions.~~

One- and Two-Family Dwellings. The minimum fire flow and flow duration requirements for one- and two-family dwellings having a fire flow area that does not exceed 5000 ft² (334.5 m²) should be at 1000 gpm (3785 L/min) or 500 gpm when an approved automatic sprinkler system is installed throughout and/or separated from other buildings by a minimum of 30 ft. (9.1 m). The minimum fire flow duration is for 1 hour.

A reduction in required fire flow of 50 percent is permitted when the building is provided with an approved automatic sprinkler system.

A reduction in the required fire flow of 25 percent is also permitted when the building is separated from other buildings by a minimum of 30 ft. (9.1 m).

The reduction for an approved automatic sprinkler system and/or separated from other buildings cannot reduce the required fire flow to less than 500 gpm (1900 L/min).

Fire flow and flow duration for dwellings having a fire flow area in excess of 5000 ft² (334.5 m²) cannot be less than that specified for Buildings Other Than One- and Two-Family Dwellings.

Buildings Other Than One- and Two-Family Dwellings. The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall not be less than 1000 gpm (3785 L/min) or 600 gpm (2270 L/min) when the building is protected throughout by an approved automatic sprinkler system and quick response sprinklers are utilized throughout.

A reduction in the required fire flow of 75 percent is permitted when the building is protected throughout by an approved automatic sprinkler system.

A reduction in the required fire flow of 75 percent is permitted when the building is protected throughout by an approved automatic sprinkler system, which utilizes quick response sprinklers throughout. The resulting fire flow shall not be less than 600 gpm (2270 L/min).

Statement of Problem and Substantiation for Public Input

Annex note 4.4 refers the user to NFPA 1, Section 18.4, to determine adjustments to fire flow calculations. To make the document more complete with these references include in the annex note as to the adjustments allowed for in fire flow calculations when fire sprinkler systems are installed. Also this will allow the user the information and data needed to make these decisions for water supply requirements. Annex note 4.4 is modified by adding additional information to assist user further with determining fire flow requirements adjustments.

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Submittal Date: Tue Sep 24 19:36:26 EDT 2013



Public Input No. 15-NFPA 1142-2013 [Section No. A.6.3.1]

A.6.3.1



The types of construction include five basic types designated by roman numerals as Type I, Type II, Type III, Type IV, and Type V. This system of designating types of construction also includes a specific breakdown of the types of construction through the use of arabic numbers. These numbers follow the roman numeral notation where identifying a type of construction (e.g., Type I-442, Type II-111, Type III-200).

The arabic numbers following each basic type of construction (e.g., Type I, Type II) indicate the fire resistance rating requirements for certain structural elements as follows:

- (1) First arabic number: Exterior bearing walls
- (2) Second arabic number: Columns, beams, girders, trusses and arches, supporting bearing walls, columns, or loads from more than one floor
- (3) Third arabic number: Floor construction

Specific fire resistance ratings are found in Table 6.3.1, and additional information is found in NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*.

ADD TABLE FROM NFPA 101 HANDBOOK HERE THAT CORRELATES 220 WITH ICC CONSTRUCTION TYPES.

Statement of Problem and Substantiation for Public Input

The table can be found in the NFPA 101 Handbook and is a good guide for the user in dealing with quick conversions from ICC to NFPA construction types. Most jurisdictions in the US use the ICC buildings codes and attempting to determine a construction type conversion can be complicated and time consuming for the user.

Submitter Information Verification

Submitter Full Name: Bill Galloway

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Submittal Date: Wed Oct 30 13:56:01 EDT 2013



Public Input No. 28-NFPA 1142-2013 [Chapter B]

Annex B— Non-Municipal Type Water Supply Sources

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 General.

The fire department operating without a water system or with hydrants on a weak distribution system has the following three means of getting adequate water for fire fighting:

- (1) From supplies at or near the incident scene, which can be either constructed or natural supplies
- (2) From supplies transported to the scene
- (3) By relaying water from a source to the fire scene using large-diameter hose

B.2 Locating Water Sources.

Aircraft and aerial photographs can be very helpful in a survey of static water availability. Such photographs are usually available from the county agriculture department or the county office of planning and zoning. Up-to-date topographical maps from the United States Geological Survey also can be of value in surveying an area for available water sources. Once sites are located, they should be prepared for use according to the recommendations of this annex.

B.3 Natural Water Sources.

B.3.1 Streams.

Streams, including rivers, bays, creeks, and irrigation canals, can represent a continuously flowing source of substantial capacity. Where assessing water from flowing streams as potential water sources, the fire department should consider the following factors:

- (1) *Flowing Capacity.* The stream should deliver water in capacities compatible with those outlined in the water supply requirements of this standard. (See *Chapter 4.*)
- (2) *Climatic Characteristics.* Streams that deliver water throughout the year and are not susceptible to drought are desirable for fire protection. However, where such streams are not available, a combination of supplies might be necessary. In many sections of the country, streams cannot be relied on during drought seasons. If the stream is subject to flooding or freezing, special evolutions might be necessary to make the stream usable under such conditions. Similar circumstances might exist during wet periods or when the ground is covered with snow.
- (3) *Accessibility.* A river or other source of water might not be accessible to the fire department for use during a fire. Distance and terrain from the all-weather road to the source should be such as to make the water readily available. In some cases, special equipment might be needed to obtain the water. Where roadways are provided to the water source, they should be constructed in accordance with Section 7.5.
- (4) *Calculating the Flow of a Stream.* A simple method for estimating the flow of water in a stream is to measure the width and depth of the stream. Drop a cork or any light floating object into the water, and determine the time it takes the cork to travel 10 ft (3.1 m). To obtain complete accuracy, the sides of the stream should be perpendicular, the bottom flat, and the floating object should not be affected by the wind. Where the sides and bottom of the stream are not uniform, the width and depth can be averaged.

For example, in a stream that is 4 ft (1.2 m) wide and 6 in. (150 mm) deep, the flow of water is such that it takes 45 seconds for a cork to travel 10 ft (3.1 m). Therefore the following formula should be used:



where:

W = width of 4 ft (1.2 m)

D = depth of 6 in. (150 mm) = $\frac{1}{2}$ ft (0.15 m)

TD = travel distance of 10 ft (3.1 m)

Calculate the flow of water as follows:

$$4 \text{ ft} \times \frac{1}{2} \text{ ft} \times 10 \text{ ft} = 20 \text{ ft}^3 \quad (1.2 \text{ m} \times 0.15 \text{ m} \times 3.1 \text{ m} = 0.56 \text{ m}^3)$$

The cork takes 45 seconds to flow the 10 ft (3.1 m) distance. Divide the volume by the time as follows:

$$20 \text{ ft}^3 (0.56 \text{ m}^3) / 45 \text{ sec} = 0.44 \text{ ft}^3/\text{sec} (0.0125 \text{ m}^3/\text{sec})$$

Convert the flow from seconds to minutes:

$$0.444 \text{ ft}^3/\text{sec} (0.0125 \text{ m}^3/\text{sec}) \times 60 \text{ sec} = 26.64 \text{ ft}^3/\text{min} (0.75 \text{ m}^3/\text{min})$$

Using conversion factors [1 ft³ = 7.48 gal (28.31 L); and 1 gal = 3.785 L], convert these values to gal/min (L/min):

$$26.64 \text{ ft}^3/\text{min} \times 7.48 = 199.27 \text{ gal}/\text{min} (754 \text{ L}/\text{min})$$

For assistance in more accurately determining stream flow, contact the state department of natural resources, soil conservation service, county cooperative extension agents, or U.S. Geological Survey.

B.3.2 Ponds.

Ponds can include lakes or farm ponds used for watering livestock, irrigation, fish culture, recreation, or other purposes, while serving a secondary function for fire protection. Valuable information concerning the design of ponds can be obtained from county agricultural agents, cooperative extension offices, county engineers, and so forth. Most of the factors for assessing water from streams are pertinent to ponds, with the following items to be considered:

- (1) Minimum annual level should be adequate to meet water supply needs of the fire potential the pond serves.
- (2) Freezing of a stationary water supply, contrasted with the flowing stream, presents a greater problem.
- (3) Silt and debris can accumulate in a pond or lake, reducing its actual capacity, while its surface area and level remain constant. These conditions can provide a deceptive impression of capacity and call for at least seasonal inspections. See [Figure A.8.5\(b\)](#) for an example of protective measures for silt and mud conditions.

B.3.3 Other Natural Sources.

Other natural sources might include springs and artesian wells. Individual springs and occasional artesian water supplies exist in some areas and, again, while generally of more limited capacity, they can be a useful water supply, subject to reasonable application of the factors listed for ponds and streams. In many cases, it might be necessary to create a temporary natural pool or pond with a salvage cover for the purpose of collecting enough water for the fire department's use.

B.4 Cisterns.

B.4.1 General.

Cisterns are one of the oldest sources of emergency water supply, both for fire fighting and drought storage. They are very important sources of water for domestic consumption, as well as for fire fighting and drought storage in many rural and beach areas.

Cisterns should have a minimum usable volume as determined by the AHJ, based on the methods described in Chapter 4. There is no real limit to the maximum capacity. It is convenient for a cistern to be adjacent to a public right-of-way for winter maintenance and access. [See *Figure B.4.1(a)*.] The dry hydrant associated with the cistern should be located at least 100 ft (30 m) from the closest structure.

Figure B.4.1(a) Cistern Site.



Figure B.4.1(b) Typical Cistern.



The water level of a cistern can be maintained by rainfall, water pumped from a well, water hauled by a mobile water supply apparatus, or the seasonal high water of a stream or river. The top of the cistern should be a minimum of 2 ft (0.6 m) below grade.

Cisterns should be capped for safety, but they should have openings to permit inspections and use of suction hose when needed. [See *Figure B.4.1(b)*.]

B.4.2 Construction of Cisterns.

Construction of cisterns is governed by local conditions of soil and material availability. Some engineering considerations to be used in designing cisterns include the following:

- (1) The base, walls, and roof should be designed for highway loading and for the prevailing soil conditions.
- (2) If groundwater conditions are high, the cistern should not float when it is empty.
- (3) Suction piping should be designed to minimize whirlpooling.
- (4) Vent piping should be of sufficient size to allow drafting from the cistern at the maximum capability permitted by the suction piping.

Maintenance factors to be considered by the fire department include the danger of silting, evaporation or other low water conditions, and the freezing problems discussed in [B.3.2](#).

B.4.3 Cistern Specifications.

Some governing bodies require developers to provide cisterns with all subdivisions that are constructed, where on-site water systems are not available or adequate.

The following specifications for cistern design and construction are used by the New Boston Fire Department, New Boston, NH:

- (1) Cisterns must be located no more than 2200 ft (671 m) truck travel distance from the nearest lot line of the furthest lot.
- (2) The design of a cistern must be trouble-free and last a lifetime.
- (3) The cistern capacity must be 30,000 gal (113,560 L) minimum, available through the suction piping system.
- (4) The suction piping system must be capable of delivering 1000 gpm (3800 L/min).
- (5) The design of the cistern must be submitted to the AHJ for approval prior to construction. All plans must be signed by a licensed/registered professional engineer.

- (6) The entire cistern must be rated for highway loading, unless specifically exempted by the AHJ.
- (7) Each cistern must be sited to the particular location by a registered engineer and approved by the AHJ.
- (8) Cast-in-place concrete must achieve a 28-day strength of a gauge pressure of 3000 psi (20,700 kPa). It must be placed with a minimum of 4 in. (100 mm) slump and vibrated in a professional manner.
- (9) The concrete must be mixed, placed, and cured without the use of calcium chloride. Winter placement and curing must follow the accepted American Concrete Institute (ACI) codes.
- (10) All suction and fill piping must be ASTM International Schedule 40 steel. All vent piping must be ASTM Schedule 40 PVC.
- (11) All PVC piping must have glued joints.
- (12) Any reducing fittings used in the piping must be an eccentric reducer.
- (13) The final suction connection must be 4 1/2 in. (115 mm) male National Standard hose thread and must be capped.
- (14) The filler pipe siamese must have 2 1/2 in. (65 mm) female National Standard threads with plastic caps.
- (15) The entire cistern must be completed and inspected before any backfilling is done.
- (16) All backfill material must be screened gravel with no stones larger than 1 1/2 in. (38 mm) and must be compacted to 95 percent in accordance with ASTM D 1557, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lbf/ft³ (2,700 kN-m/m³)]*.
- (17) Bedding for the cistern must consist of a minimum of 12 in. (300 mm) of 3/4 in. to 1 1/2 in. (20 mm to 40 mm) crushed, washed stone, compacted. No fill can be used under the stone.
- (18) The filler pipe siamese must be 36 in. (900 mm) above final backfill grade.
- (19) The suction pipe connection must be 20 in. to 24 in. (500 mm to 600 mm) above the level of the shoulder where vehicle wheels will be located when the cistern is in use.
- (20) The suction pipe must be supported either to the top of the tank or to a level below the frost line.
- (21) The base must be designed so that the cistern will not float when empty.
- (22) The perimeter of the cistern at floor/wall joint must be sealed with 8 in. (200 mm) PVC waterstop.
- (23) After backfilling, the cistern must be protected by fencing or large stones.
- (24) Backfill over the tank must have one of the following characteristics:
 - (a) 4 ft (1.2 m) of fill.
 - (b) The top and highest 2 ft (0.6 m) of sides of the cistern must be insulated with vermin-resistant foam insulation and 2 ft (0.6 m) of fill.
 - (c) All backfill must extend 10 ft (3.1 m) beyond the edge of the cistern, and have a maximum 3:1 slope, loamed and seeded.

- (25) The bottom of the suction pipe to the pumper connection must not exceed 14 ft (4.25 m) vertical distance.
- (26) The pitch of the shoulder and vehicle pad from the edge of the pavement to the pumper suction connection must be 1 percent to 6 percent downgrade.
- (27) The shoulder and vehicle pad must be of sufficient length to permit convenient access to suction connection when the pumper is set at 45 degrees to road.
- (28) All construction, backfill, and grading material must be in accordance with proper construction practices and acceptable to the AHJ.
- (29) All horizontal suction piping must slope slightly uphill toward the pumper connection.
- (30) The installer is responsible for completely filling the cistern and maintaining it full until the installation is accepted by the AHJ.

As an alternative where soil and groundwater level conditions permit, a properly designed well can be used to provide water. [Figure B.4.3](#) illustrates a typical well with a dry hydrant installed. Local conditions must be considered in all cases. A high water table that allows a suction lift of not more than 10 ft (3 m) must be present. The well must be installed in gravel or sand, not clay.

The same design is suitable for a cistern if the bottom of the casing is not perforated.

Figure B.4.3 Typical Well or Cistern with Dry Hydrant Installed.



B.4.4 Guide to Cistern Capacity.

The following formula can also be used to calculate the usable amount of water in a round cistern with vertical sides:



where:

D_f = inside diameter of the cistern in feet, or D_m inside diameter in meters

H_f = usable depth of water in the cistern in feet, or H_m = usable depth of water in meters

The following formula can be used to calculate the usable amount of water in a rectangular cistern:



or



where:

L_f = length in feet, or L_m = length in meters

W_f = width in feet, or W_m = width in meters

H_f = usable depth of water in feet, or H_m = usable depth of water in meters

When reference is made to water depths in cisterns, swimming pools, streams, lakes, and other sources, it should always be remembered that the depth with which the fire fighter is

concerned is the usable depth. In a cistern, a bottom bed of gravel protecting a dry hydrant inlet, for instance, reduces the usable depth of the area above the gravel.

B.5 Fiberglass Underground Storage Tanks.

Some fire departments are using new fiberglass underground storage tanks to store water for fire protection. This application is very similar to using a cistern, except that the tanks are manufactured off site whereas a cistern is built on site. These tanks are fitted with suction and fill piping and placed strategically around the community. (See [Figure B.5](#).)

Figure B.5 Example of Construction of Water Cisterns Using an Underground Fiberglass Storage Tank.



B.6 Swimming Pools.

Swimming pools are an increasingly common source of water for fire protection. Even in some areas with normally adequate water supplies from hydrants, pools have been a factor in providing protection, such as where water demands have exceeded availability because of wildfires or natural disasters. Swimming pools provide an advantage in that they are sources of clean water, but a major drawback is their poor accessibility for large, heavy fire apparatus. There are some areas of the country in which there are more swimming pools than fire hydrants. If the fire department intends to use a swimming pool as a supply of water, it is a good practice to work with the pool owner and preplan how the water will be accessed.

B.6.1 Pool Accessibility.

If fire department accessibility is considered at the time the pool is designed, a usable water supply should be available to the fire department for directly supplying hose lines or filling mobile water supply apparatus. Most swimming pools are built in areas requiring security fencing or walls, and these can complicate accessibility. Fences and walls can be designed for fire department use or, depending on construction, can be entered forcibly. In most cases, a solution to the problem of accessibility can be achieved through preplanning. A solution might call for long lengths of suction hose, portable pumps, dry hydrants, siphon ejectors, or properly spaced gates. Lightweight or flexible-type suction hose can be advantageous in these situations. Portable (or floating) pumps designed for large-volume delivery at limited pressures can deliver water to portable folding tanks or fire department pumpers and are frequently ideal where accessibility problems exist. (See [Section E.3](#).)

A swimming pool located virtually under the eaves of a burning house can be a very poor location from which to pump if there is fire exposure to the work area. Pumping from a neighboring pool if it is close enough or using a water-hauling program is frequently preferable to pumping from a pool adjacent to the burning house.

B.6.2 Pool Capacity.

The following formula is a short-form method of estimating pool capacity:

$$C = \frac{L_f \times W_f \times D}{2.31}$$

or

$$C = \frac{L_m \times W_m \times D}{7.48}$$

where:

L_f = length in feet or L_m = length in meters

W_f = width in feet or W_m = width in meters

D_f = estimated average depth from water line in feet or D_m = estimated average depth from water line in meters

Note that the dimensions used in the formula should be an average if the pool is of a stylized construction.

Consideration should be given for providing more suction hose on fire apparatus responding in areas dependent on swimming pools. Fast rigging of such suction hose demands special training. Using long lengths of hose over walls and other obstacles typical of areas around swimming pools demands techniques other than those used for drafting from ponds or streams. Adequate pre-fire planning will provide knowledge of individual pools so that the method of obtaining water at the property is known.

B.6.3 Care in Use of Pools.

Care has to be exercised to be sure structural damage will not be done to a pool and the surrounding area if the water is used for fire fighting. Lightly built cement, Gunite®, or poured concrete pools can present a danger of structural damage, cracking, or collapse when drained. If a pool is located in extremely wet soil, it will tend to float upwards when drained. In these cases, the pool should be refilled as soon as the fire is under control and mobile water supply apparatus can be released from fire duties.

Some pools are compacted earth covered by a plastic surfacing or light-gauge metal panels placed against such earth or a special fill. Such pools can collapse internally if emptied. It might be possible to use a limited portion of such water sources but not possible to use the entire depth apparently available. It might be prudent not to use these pools at all.

Another consideration is whether the ground surrounding a pool will support the weight of a fire department vehicle without collapsing. The fire department should consult with the builder or installer of any pool being considered as a water source to determine the various pool limitations.

B.7 Livestock Watering Ponds and Tanks.

Many farms have livestock water tanks and other similar water facilities. If the owner is made aware of the water needs for fire fighting on the farm, such tanks and ponds can be sized to provide adequate volume for both farm and fire department use and located to be readily available to the fire department. Tanks should be placed on the edge of the barnyard where they are accessible for fire apparatus to take suction through a connection on the tank or with suction hose directly into the tank. These watering tanks and ponds are often filled and maintained full by a pump operated by a windmill or by an electric pump. [Figure B.7](#) illustrates a dry hydrant system for holding tanks and procedures for successfully using the system as a water source.

Figure B.7 Drafting Procedure for Farm Holding Tanks.



B.8 Stored Water for Sprinkler Systems.

In some rural areas, the only large water supply might be the storage provided for the sprinkler system in a building. The supply might be from an underground water distribution system, a pond or suction tank with pumps, an elevated tank, or a combination of these. In many cases, pre-plan arrangements can be made to use some of the stored water for fire protection away from the property. This is particularly true if the property owner is contacted before installation of the sprinkler protection, as it might be necessary to increase the storage capacity or to install a hydrant that is accessible to the fire department and connected to the private yard distribution system.

Extreme care should be exercised in the use of water supplies provided for sprinkler protection. Unless the water supply has been specifically designed to provide water for fire

protection away from the property, it should not be used. (See Annex F for additional information on sprinkler systems.)

B.9 Driven Wells.

Wells, well systems, and irrigation pumps are becoming increasingly popular as water supplies for fire-fighting purposes at industrial properties, shopping centers, subdivisions, and farmhouses located in rural areas beyond the reach of a municipal-type water distribution system.

In areas with suitable soil conditions such as those of a very sandy nature, it might be possible to use driven wells or water-jetted wells to obtain water for fire fighting. These wells are, in essence, pipes driven into the ground, usually with perforations about the base to permit entry of water. From the threaded pipe head (or a fitting attached to the body of the pipe), a pump connection can be made to draft water the same as from a well head hydrant. A high water table is a prerequisite to using this method. Fire-fighting units in areas where well head hydrants are available should have the necessary adapters to utilize such sites.

B.10 Pre-Fire Planning for Water Supply Operations.

Once the water supply requirements have been calculated and the water sources identified, the type and amount of fire equipment needed to respond on the first alarm to deliver that requirement should be determined. The objective should be to have the response of fire apparatus match the need to deliver a constant flow at least equal to the water flow requirements. The fire department should develop standard operating guidelines for hauling or relaying water to fires. The guidelines should be verified under training conditions prior to a fire emergency. Training exercises should include locating fire equipment at a fire scene to protect the fire property and the exposures, establishing operations at the water source to either fill water tanks on fire apparatus or pump into a relay, designating fire lanes or routes between the water source and the incident scene, and reviewing and modifying the operations to meet unusual conditions. Once implemented, the standard operating guidelines should be initiated for all reported structure fires, recognizing that they can be discontinued or canceled after the officer in charge has evaluated the fire and determined that additional water supply will not be needed.

Statement of Problem and Substantiation for Public Input

This PI change only proposes changing the title of this section from "Water Supply" to "Non-Municipal Type Water Supply Sources." The title change better conveys the content of the section. An option would be to use the term "Alternative Water Supply" as that term is already defined in this document.

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NFPA Public Input No. 23-NFPA 1142-2013 [Section No. F.3.1]

F.3.1 Installation of Water Supplies.

Water supplies for the automatic sprinkler system referred to in Section 4.4, which consist of pumps and tank combinations feeding yard mains and a hydrant system, should be installed in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, NFPA 24: Standard for the Installation of Private Fire Service Mains and their Appurtenances and NFPA 22, *Standard for Water Tanks for Private Fire Protection*.

Statement of Problem and Substantiation for Public Input

Yard mains and hydrants should be installed in accordance with NFPA 24. This PI provides that guidance to the user.

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NFPA Public Input No. 24-NFPA 1142-2013 [Section No. F.3.3]

F.3.3 Use of Fire Department Connection.

The standard operating procedures (SOPs) of each rural fire department should require one of the first-response pumpers to pump to the fire department connection of the sprinkler system. In this way, water pressure and volume to the system can be increased, making the sprinklers more effective. Also, the fire department connection ~~should~~ may tie into the system beyond all valves that might be shut off; therefore, even with the valve controlling the water supply to the sprinkler system shutoff, sprinkler heads ~~can always~~ may be supplied with water through the fire department connection. After assessment by the officer in charge, a decision to charge the system might be warranted. The pressure available from the fire department pumper will not burst the piping or heads of the sprinkler system, as all parts of the system are designed and tested to withstand at least 200 psi (1380 kPa).

Statement of Problem and Substantiation for Public Input

The statement in this section is incorrect. NFPA 13 section 8.17.2.4.4 and 8.17.2.4.2 permits a number of arrangements where the fire department connection ties into the fire sprinkler system prior to the system control valves. Also see figure A.8.17.2.4.4(a) and figure A.8.17.2.4.4(b) of NFPA 13.

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Public Input No. 25-NFPA 1142-2013 [Section No. F.3.3]

F.3.3 Use of Fire Department Connection.

The standard operating procedures (SOPs) of each rural fire department should require one of the first-response pumpers to pump to the fire department connection of the sprinkler system. In this way, water pressure and volume to the system can be increased, making the sprinklers more effective. Also, the fire department connection should tie into the system beyond all valves that might be shut off; therefore, even with the valve controlling the water supply to the sprinkler system shutoff, sprinkler heads can always be supplied with water through the fire department connection. After assessment by the officer in charge, a decision to charge the system might be warranted.

The supply line should be pumped and the line charged to a pressure of 10.0 bar (150 psi), unless the system is posted for a different pressure. The pressure available from the fire department pumper will not burst the piping or heads of the sprinkler system, as all parts of the system are designed and tested to withstand at least 200 psi (1380 kPa).

Statement of Problem and Substantiation for Public Input

Guidance should be provided to the user as to what is the appropriate pressure to utilize in charging the FDC. The proposed language is from section 4.3.4 of NFPA 13E.

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NFPA Public Input No. 26-NFPA 1142-2013 [Section No. F.3.4]

F.3.4 Shutting Off Sprinkler System After the Fire.

The sprinkler system should not be shut down until the officer in charge is convinced that the fire is extinguished or controlled and handlines are in place for overhauling operations.

A sprinkler system should not be shut down to improve visibility. Even then, the fire department pumper should not be disconnected from the fire department connection to the sprinkler system until the officer in charge is certain that the fire is out. A person should be stationed at the control valve of the sprinkler system, ready to reopen the valve in case of a flare-up during fire department mop-up operations.

Statement of Problem and Substantiation for Public Input

The proposed language is from NFPA 13E section 4.3.3 and provides added guidance to the user as to when the system should NOT be shut down.

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NFPA Public Input No. 14-NFPA 1142-2013 [Section No. G.1]

G.1 General.

The water supply for fire-fighting purposes, as specified in Chapter 4, is considered the minimum water supply necessary for basic fire fighting. It is assumed that the water is made available at the fire scene from a single water point such as a dry hydrant, often using a mobile water supply shuttle in conjunction with a portable folding tank(s) or a water supply relay.

The AHJ can determine that a municipal-type water system is warranted. This determination might be made as a result of an on-site survey of buildings by the fire department having jurisdiction or by review of architectural plans of proposed construction and planned development.

Statement of Problem and Substantiation for Public Input

Annex G appears to be based heavily on the ISO Guide for Determining Needed Fire Flow. This guide is in the process of being updated to be consistent with the ISO Fire Suppression Rating Schedule changes that were implemented in July 1st 2013 in most states. The FSR

contained a number of changes to fire flow particularly dealing with 13R and 13D fire sprinkler protected properties and their fire flow. Annex G, including table G.4.4.5, should be reviewed in context with the FSRs and GDNFF updates.

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Public Input No. 27-NFPA 1142-2013 [Sections G.3, G.4, G.5, G.6]

~~Sections G.3, G.4, G.5, G.6~~

~~G.3 Developing Fire Flow Requirements for a Municipal-Type Water System.~~

~~The factors to be considered in developing the fire flow requirements for a building on a municipal-type water system are shown in G.3.1 through G.3.4.~~

~~G.3.1 Type of Construction (C_i).~~

~~Combustibility and fire resistance of the building itself greatly influence the development and spread of a fire and, to a large extent, determine the amount of water needed to control and extinguish a fire.~~

~~G.3.2 Size of Building (A_i).~~

~~The greater the building height and the larger the undivided floor area, without fire walls, division walls, or other fire separation, the greater the potential for a large fire, and the greater the fire flow requirement.~~

~~G.3.3 Occupancy (O_i).~~

~~A fire in a building having highly combustible contents will require a higher rate of water application than a fire in a building with contents of low combustibility. Examples are a wastepaper warehouse (highly combustible contents) and a steel pipe warehouse (contents with low combustibility), with many variations in between.~~

~~G.3.4 Exposures (X_i) and Communications (P_i).~~

~~In addition to the water needed for a fire in the building under consideration, additional water might be needed to prevent a fire from spreading to nearby buildings. The amount of this extra water will depend on such factors as the distance between buildings and the type of construction and size of the exposed and communicating buildings.~~

~~The method of determining the fire flow requirement in this annex does not include details for calculating an adequate amount of water for large, special fire protection problems, such as lumberyards, petroleum storage, refineries, grain elevators, and large chemical plants. For suggested protection, see applicable NFPA standards.~~

G.4 Calculation of Fire Flow.

For calculating the fire flow requirement of a subject building in gallons per minute, the construction (C_i), occupancy (O_i), exposure (X_i), and communication (P_i) factors of the selected building or fire division are considered. Construction and occupancy hazard classification tables referenced in G.4.2 have been developed from equation information derived from the formula in G.4.1. Examples of actual calculations are included in Section G.5.

G.4.1 Construction Factor (C_i).

That portion of the fire flow requirement attributed to the type of construction and area of the selected building or fire division is determined by the following formula:

$$C_i = 1.0 \left(\frac{A_i}{A} \right)^{0.15}$$

where: C_i = construction factor F = coefficient related to the class of construction as follows:
=1.5 for wood frame construction =1.0 for ordinary construction =0.8 for noncombustible construction =0.6 for fire-resistive construction A_i = effective area in square feet

The effective area is the total floor area of the largest story in the building plus the following percentages of the other stories:

- (1) For buildings of construction Types II, III, IV, and V, 50 percent of the total floor area of all other stories
- (2) For buildings of construction Type I, either of the following two percentages as applicable:
 - (a) If all vertical openings in the building have 1-hour or greater protection, 25 percent of the total floor area of the building not to exceed the floor area of the second- and third-largest stories
 - (b) In other buildings, 50 percent of the total floor area of the building not to exceed the area of eight additional stories

If division walls are rated at 1 hour or more, with labeled Class B fire doors on openings, the story is to be considered subdivided. The maximum area on any one story used is the largest undivided area plus 50 percent of the second largest undivided area on that story.

The floor area of basements and sub-basements that are vacant or are used for building maintenance, or that are occupied by light-hazard or low-hazard occupancies, are not to be included in the calculation of the effective area.

G.4.1.1 Calculating Predominant Construction.

In buildings of mixed construction types, the predominant construction class is determined as shown in G.4.1.1.1 through G.4.1.1.4.

G.4.1.1.1 Fire-Resistive.

Any building with 66^{2/3} percent or more of the total wall area and 66^{2/3} percent or more of the total floor and roof area defined as construction Type I, is classified as fire-resistive.

G.4.1.1.2 Noncombustible.

Any building with 66^{2/3} percent or more of the total wall area and 66^{2/3} percent or more of the total floor and roof area defined as construction Types II and IV, or any building not qualifying under G.4.1.1.1, with 66^{2/3} percent or more of the total wall area and 66^{2/3} percent or more of the total floor and roof area constructed in two or more of construction Types I, II, and IV, but with no single type itself equal to 66^{2/3} percent or more of the total area, is classified as noncombustible.

G.4.1.1.3 Ordinary.

Any building not qualifying under G.4.1.1.1 or G.4.1.1.2, with 66^{2/3} percent or more of the total wall area of construction Type III, or any building not qualifying under G.4.1.1.1 or G.4.1.1.2, with 66^{2/3} percent or more of the total wall area and 66^{2/3} percent or more of the total floor and roof area constructed in two or more of construction Types I, II, III, and IV, but with no single type itself equal to 66^{2/3} percent or more of the total area, is classified as ordinary.

G.4.1.1.4 Frame.

Any building not qualifying under G.4.1.1.1 through G.4.1.1.3, or any building with over 33^{1/3} percent of the total wall area of combustible construction, regardless of the type of construction of the balance of the building, is defined as construction Type V.

G.4.1.2 Limitations.

In the application of G.4.1.1.1 through G.4.1.1.4, basement walls and the lowest floor level should be disregarded.

The maximum value of (C_i) is limited by the following:

- (1) 8000 gpm (30,280 L/min) for wood frame and ordinary construction
- (2) 6000 gpm (22,710 L/min) for noncombustible and fire-resistive construction
- (3) 6000 gpm (22,710 L/min) for a one-story building of any type of construction

The minimum value of (C_i) is 250 gpm (950 L/min). The calculated value of (C_i) should be rounded to the nearest 250 gpm (950 L/min).

G.4.2 Occupancy Factor (O_i) .

The occupancy factors shown in Table G.4.2(a) reflect the influence of the occupancy hazard in the selected building on the fire flow requirement.

Table G.4.2(a) Influence of Occupancy in Determining Fire Flow Requirement

Occupancy Hazard Classification	Occupancy Factor
(O) 7 (light hazard)	0.756 (low hazard)
0.855 (moderate hazard)	1.004 (high hazard)
1.153 (severe hazard)	1.25

Representative lists of occupancies by occupancy hazard classification number are located in Chapter 5.

Table G.4.2(b) through Table G.4.2(e) include the occupancy factors (O_i) applied for each type of construction.

Table G.4.2(b) Wood Frame Construction ($F = 1.5$) and Occupancy Hazard Classification

Occupancy Hazard Class	O_i
7	0.75
6	0.85
5	1.00
4	1.15
3	1.25

Effective Area (ft²)

Effective Area (ft ²)	Effective Area (ft ²)	Effective Area (ft ²)	Effective Area (ft ²)	Effective Area (ft ²)	Effective Area (ft ²)		
09505000750500055050004005000	350500951185075075114507505511050750401800750351650750185134001000145124001	000105117501000801130010006511100100031014600125024013600125017512600125013	011950125011011650125046016450150036015000150026013600150019512750150016512	300150064518550175050016650175036014800175027513650175023013400175085511100	020006651960021244801620020003651470020003101395020001100113750225096011070	022506201775022504701585022503951495022501375116800250010701131002500775194	502500585171502500495160502500168012015027501310115700275094511135027507151

501024011103006750867019335067502593012785007000201901216850700014585115665
070001103011184507000933511002507000278501298400725021685123230072501566511
678507250118451126900725010025110740072502984013189507500232301248350750016
785117940075001269011356507500107401114850750031895134025077502483512649007
750179401191400775013565114470077501148511225007750340251362150800026490128
19508000191401203700800014470115405080001225011304008000

For SI units, 1 gpm = 0.0631 L/sec; 1 ft² = 0.093 m².

Table G.4.2(d) Noncombustible Construction (F = 0.8) and Occupancy Hazard Classification

Occupancy Hazard Class 7

$O_i = 0.75$ Occupancy Hazard Class 6

$O_i = 0.85$ Occupancy Hazard Class 5

$O_i = 1.00$ Occupancy Hazard Class 4

$O_i = 1.15$ Occupancy Hazard Class 3

$O_i = 1.25$ Effective Area (ft²) Effective Area (ft²) Effective Area (ft²) Effective Area (ft²) Effective Area

(ft²) from to gpm from to gpm from to gpm from to gpm from to gpm from to gpm 03350500026005000190050001400
500012005003351655075026015100750190137007501401280075012012350750655110850
100051018450100037016100100028014600100023513900100010851162001250845112600
125061019100125046016900125039015850125016201226001500126011760015009101127
501500690196001500585181501500226013010017501760123450175012751169501750960
112800175081511085017503010138700200023451337502124169512175020001280116450
200010851139502000387014835022503375137650225021751272002250164512055022501
395117400225048351590502500376514595025002720133200250020551251002500174012
125025005905170850275045951551502750332013985027502510130150275021251255002
750708518370030005515165150300039851471003000301513560030002550130150300083
701976003250651517600032504710154900325035601415003250301513515032509760111
260035007600187700350054901633503500415014795035003515140550350011260112870
037508770110020037506335172400375047951547503750405514635037501287011458504
000100201113550400072401820504000547516205040004635152500400014585116405042
501135511277004250820519230042506205169800425052501590504250164051183350450
012770114275045009230110315045006980178000450059051660004500183351203700475
014275115860047501031511146004750780018665047506600173350475020370122515050
001586011753005000114601126650500086651957505000733518105050002251512476505
250175301192800525012665113930052509575110535052508105189150525024765127120
055001928012111505500139301152550550010535111535055008915197650550027120129
585057502111512303505750152551166400575011535112585057509765110650057502958
513215506000230351250350600016640118090060001258511368006000106501115750600
032155134835062502503512712006250180901195950625013680114815062501157511254
006250348351376200650027120129290065001959512116506500148151160000650012540
113545065003762014051506750292901315450675021165122790067501600011723506750
135451145850675040515143515070003154513388007000227901244800700017235118510
070001458511566507000435151466250725033880136300072502448012622507250185101
198300725015665116785072504662514984007500363001388000750026225128035075001
983012120007500167851179400750049840153160077503880014139007750280351299050
775021200122610077501794011914007750531601565900800041390144060080002990513
18300800022610124070080001914012037008000

For SI units, 1 gpm = 0.0631 L/sec; 1 ft² = 0.093 m².

Table G.4.2(e) Fire-Resistive Construction (F = 0.6) and Occupancy Hazard Classification

Occupancy Hazard Class 7

$O_i = 0.75$ Occupancy Hazard Class 6

$O_i = 0.85$ Occupancy Hazard Class 5

$O_i = 1.00$ Occupancy Hazard Class 4

$Q_i = 1.15$ Occupancy Hazard Class 3

$Q_i = 1.25$ Effective Area (ft²) Effective Area (ft²) Effective Area (ft²) Effective Area (ft²) Effective Area

(ft²) from to gpm from to gpm from to gpm from to gpm from to gpm from to gpm 05950500046505000335050002550
500021505005951116507504651905075033516550750255149507502151420075011651192
501000905115000100065511085010004951820010004201695010001925128800125015001
224001250108511620012508201122501250695110350125028801402001500224013130015
001620122600150012251171001500103511450015004020153550175031301417001750226
013010017501710122800175014501193001750535516880020004170160000212430101387
002000228012925020001930124750200068801859502250600016690022503870148350225
029251365502250247513095022508595110500025006690181750250048351590502500365
5144650250030951378002500105001125950275081751498050275059051708502750446515
355027503780145350275012595114880030009805111585030007085183700300053551633
003000453515355030001488011735503250115851135100325083701976003250633017380
032505355162500325017355120020035001351011559003500976011126003500738018520
035006250172100350020020122880037501559011781003750112601128700375085201973
003750721018235037502288012592504000178101201850400012870114585040009730111
030040008235193350400025925129165042502018512270504250145851164050425011030
112405042509335110500042502916513259504500227051253750450016405118335045001
240511386504500105001117350450032595136215047502537512819504750183351203700
475013865115405047501173511303504750362151400250500028195131160050002037012
251505000154051170250500013035114410050004002514402505250311601342750525022
515124765052501702511872505250144101158500525044025148215055003427513754005
500247651271200550018725120505055001585011735505500482151525950575037540140
950057502712012958505750205051223700575017355118935057505259515717006000409
501445100600029585132155060002237012431506000189351205800600057170161930062
504451014821506250321551348350625024315126340062502058012229506250619301668
850650048215152070065003483513762006500263401284500650022295124080065006688
517203006750520701560750675037620140515067502845013063506750240801259300675
072030177360070005607516023007000405151435150700030635132905070002593012785
007000773601828850725060230164530072504351514662507250329051352550725027850
129840072508288518860007500645301689800750046625149840075003525513768507500
298401318950750088600194505077506898017358007750498401531600775037685140195
077503189513402507750945051800073580178325080005316015659008000401951427900
80003402513621508000

For SI units, 1 gpm = 0.0631 L/sec; 1 ft² = 0.093 m².

G.4.3 Exposure (X_i) and Communication (P_i) Factors.

The factors X_i and P_i reflect the influence of exposed and communicating buildings, respectively, on the fire flow requirement. A value of $X_i + P_i$ should be developed for each side of the building. Where there is no exposure on any side, $X_i = 0$.

G.4.3.1 Factor for Exposure (X_i).

The exposure factor applies to only one side of the subject building and is determined based on the construction and the length-height value (length of wall in feet times height in stories) of the exposed building, and the distance between the facing walls of the subject building and the exposed building. The factor for X_i is selected from Table G.4.3.1.

Table G.4.3.1 Factor for Exposure (X_i)

Construction
of Facing Wall
of Subject Building Distance to the Exposed Building

(ft) Length-Height Value of Facing Wall of Exposed Building Construction Classes of Facing Wall of Exposed Building Construction Class 1, 3 Construction Class 2, 4, 5, and 6 Unprotected Openings Semiprotected Openings* Blank Wall Frame, metal, or masonry

with openings 0-101-1000-220-210-160101-2000-230-220-170201-3000-240-230-180301-4000-250-240-190>4000-250-250-20011-301-1000-170-150-110101-2000-180-160-120201-3000-190-180-140301-4000-200-190-150>4000-200-190-15031-601-1000-120-100-070101-2000-130-110-080201-3000-140-130-100301-4000-150-140-110>4000-150-150-12061-1001-1000-080-060-040101-2000-080-070-050201-3000-090-080-060301-4000-100-090-070>4000-100-100-080

Blank masonry wall Where the facing wall of the exposed building is higher than subject building, use Table G.4.3.1, except use only the length-height of facing wall of the exposed building above the height of the facing wall of the subject building. Buildings five stories or over in height are considered five-story buildings. Where the height of the facing wall of the exposed building is the same or lower than the height of the facing wall of the subject building, $X_i = 0$.

For SI units, 1 ft = 0.305 m.

*Wired glass or outside open sprinklers.

The following buildings are not charged as exposures:

- (1) Buildings fully protected by automatic sprinklers
- (2) Buildings with a residential occupancy
- (3) Buildings that are Type I construction
- (4) Buildings with a blank masonry wall

G.4.3.2 Factor for Communication (P_i)-

The factor for P_i depends on the protection for the communicating party wall openings and the length and construction of communications between fire divisions and is selected from Table G.4.3.2. Where more than one communication type exists in any one sidewall, only the largest factor P_i applies for that side. Where there is no communication on any side, $P_i = 0$.

Table G.4.3.2 Factor for Communications (P_i)

Fire-Resistive, Noncombustible, or Slow-Burning Communications (ft)	Communications with Combustible Construction (ft)	Open	Enclosed	Description of Protection of Passageway Openings
0-101-1000-200-300-200-10	0-101-1000-200-300-200-10	†	†	Single Class A fire door at one end of passageway
0-101-1000-200-300-200-10	0-101-1000-200-300-200-10	†	†	Single Class B fire door at one end of passageway
0-101-1000-200-300-200-10	0-101-1000-200-300-200-10	†	†	Single Class A fire door at each end or double Class A fire doors at one end of passageway
0-101-1000-200-300-200-10	0-101-1000-200-300-200-10	†	†	Single Class B fire door at each end or double Class B fire doors at one end of passageway

For SI units, 1 ft = 0.305 m.

Notes:

- (1) Where a party wall has communicating openings protected by a single automatic or self-closing Class B fire door, it qualifies as a division wall for reduction of area.
- (2) Where communications are protected by a recognized water curtain, the value of $P_i = 0$.

*For over 50 ft, $P_i = 0$.

†For unprotected passageways of this length, consider the two buildings as a single fire division.

G.4.4 Calculation.

The fire flow (FF) for a municipal-type water system is calculated as follows:

$$FF = C_i Q_i X_i P_i$$

where:

C_i = construction factor

Q_i = occupancy factor

X_i = exposure factor

P_i = communication factor

G.4.4.1

Where wood shake shingles as a roof covering are permitted by the AHJ (on the building being considered or on the exposed buildings), 500 gpm (1900 L/min) is added to the fire flow requirements unless such shingles are listed as Class C or higher.

G.4.4.2

The fire flow should not exceed 12,000 gpm (45,420 L/min) or be less than 250 gpm (950 L/min).

G.4.4.3

The fire flow requirement should be rounded off to the nearest 250 gpm (950 L/min) if less than 2500 gpm (9500 L/min), and to the nearest 500 gpm (1900 L/min) if greater than 2500 gpm (9500 L/min).

G.4.4.4

When all buildings in a planned area are protected with approved automatic sprinkler systems installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*, and have an acceptable inspection and maintenance program in place, the fire flow requirements can be reduced by 75 percent but not below 1000 gpm (3800 L/min).

G.4.4.5

For one- and two-family dwellings not exceeding two stories in height and 4300 ft² (400 m²) or less in effective area, Table G.4.4.5 should be used to determine the required fire flow from a municipal-type water system.

Table G.4.4.5 Fire Flow for Residential Property

Distance Between Buildings	Fire Flow (ft ²)	Fire Flow (m ²)
>100	>30500	19000
31-100	30500-10095	10095-30750
28501-303.4	9.41000	3800
≤10	≤3.31500	5700

G.4.4.5.1

For one- and two-family dwellings exceeding 4300 ft² (400 m²) in effective area, or over two stories in height, use the formula prescribed in G.4.4 to determine the fire flow requirement.

G.4.4.5.2

When all one- or two-family dwellings in a planned area consisting of only one- or two-family dwellings are protected with approved automatic sprinkler systems installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*, and have an acceptable inspection and maintenance program in place, the fire flow requirements may be reduced by 75 percent but not below 500 gpm (1900 L/min).

G.5 Examples of Calculating Fire Flow for a Municipal-Type Water System.

Seven examples of calculating fire flows for a municipal-type water system are shown in [G.5.1](#) through [G.5.7](#).

G.5.1 Example 1.

A three-story ordinary construction building occupied as a moderate hazard with an unused basement has a ground floor area of 7300 ft² (678.2 m²). The effective area is as follows:

$$7300 + 0.5(7300 + 7300) = 14,600 \text{ ft}^2 (1356.3 \text{ m}^2)$$

In [Table G.4.2\(c\)](#), the area of 14,600 ft² is between 13,951 ft² and 17,400 ft² (1296 m² and 1616.5 m²); therefore, under occupancy hazard classification 5, the required water supply for the construction factor (C_i) and occupancy factor (O_i) is 2250 gpm (8500 L/min). There is no exposure or communication. The calculation of the fire flow (FF), rounded to the nearest 250 gpm (950 L/min), is as follows:

$$FF_i = (C_i)(O_i) [1.0 + (X + P)_i]$$

$$FF_i = 2250 \text{ gpm} [1.0 + (0 + 0)]$$

$$FF_i = 2250 \text{ gpm (8500 L/min)}$$

G.5.2 Example 2.

A three-story wood frame building with a ground floor area of 7300 ft² (678.2 m²) communicates through unprotected openings with a five-story, ordinary construction building with a ground floor area of 9700 ft² (901.1 m²). Both buildings are operated as moderate hazard. The basements have light hazard and low hazard contents. The effective area for the building is as follows:

$$7300 + 9700 + 0.5 [2(7300) + 4(9700)] = 43,700 \text{ ft}^2 (4059.7 \text{ m}^2)$$

The (C_i)(O_i) for the building is based on the predominant construction class of the building. In this example, more than 66^{2/3} percent of the total floor and roof area is of ordinary construction. The predominant construction class is ordinary construction. Therefore, under occupancy hazard classification 5, the value for (C_i)(O_i) for an effective area of 43,700 ft² (4059.7 m²) = 3750 gpm (14,213 L/min).

G.5.3 Example 3.

A one-story, ordinary construction building occupied as moderate hazard without a basement has an area of 210,000 ft² (19,509 m²). The effective total area is 210,000 ft² (19,509 m²). [Table G.4.2\(c\)](#) indicates a (C_i)(O_i) of over 8000 gpm (30,280 L/min). However, as ordinary construction, the (C_i)(O_i) maximum is 8000 gpm (30,280 L/min) [see [G.4.1.2 \(1\)](#)]. In this example, the value for (C_i)(O_i) is further reduced to 6000 gpm (22,710 L/min) as this is a one-story building [see [G.4.1.2 \(3\)](#)].

G.5.4 Example 4.

A two-story, wood frame building occupied as moderate hazard has an area of 60,000 ft² (5574 m²) and communicates through unprotected openings to a one-story, noncombustible building with an area of 45,000 ft² (4180.5 m²). The effective area is 45,000 + 60,000 + 0.5(60,000) = 135,000 ft² (12,541.5 m²).

The (C_i)(O_i) for the building is based on the predominant construction class of the building. In this case, more than 33^{1/3} percent of the total wall area is of combustible construction. Therefore, the predominant construction class is wood frame construction.

Therefore, under occupancy hazard classification 5, the value for (C_i)(O_i) for an effective area of 135,000 ft² (12,541.5 m²) = 8000 gpm (30,280 L/min).

G.5.5 Example 5.

The subject building, a two-story building of 175 ft x 100 ft (53.3 m x 30.5 m), is located 15 ft (4.6 m) east of an exposed building identical in construction and area. Both buildings have unprotected openings. The length-height value of the exposed building is $2 \times 175 \text{ ft} = 350$. From Table G.4.3.1, the exposure factor (X_e) is 0.19, or 19 percent.

G.5.6 Example 6.

The subject building, a one-story wood-frame building of 75 ft x 100 ft (22.9 m x 30.5 m), communicates on the long side through an enclosed frame passageway 25 ft (7.6 m) in length, to an ordinary-construction building. Both buildings have unprotected window openings. The length-height value is $1 \times 100 = 100$. The exposure factor (X_e) for this side from Table G.4.3.1 is 0.15. The communication factor (P_i) for this side from Table G.4.3.2 is 0.30. The exposure and communication factor for this side (X_e) + (P_i) for the sum of 0.15 and 0.30 = 0.45.

G.5.7 Example 7.

The subject building is a one-story single-family residence with a 15 ft (5 m) side setback. The fire flow is 1000 gpm (3800 L/min) from G.4.4.5.

G.6 Fire Flow Duration.

The fire flow determined by G.4.4 should be able to be sustained for at least the amount of time shown in Table G.6.

Table G.6 Duration of Fire Flow

Fire Flow gpm/L/min Duration (hr) $\leq 2,500 \leq 9,500$ $23,000 - 3,500$ $11,350 - 13,250$ $3 \geq 4,000 \geq 15,100$

Statement of Problem and Substantiation for Public Input

The fire flow calculation in G3, G4, G5 and G6 is different from that provided in the core text of Chapter 18 of NFPA 1. This has the potential to confuse the user as to what is the "correct" fire flow calculation to utilize. The provisions of G3, G4, G5 and G6 need to be correlated with the Fire Code Committee and the NFPA 1 provisions to ensure that a single fire flow methodology is promulgated within the NFPA codes and standards system.

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Public Input No. 57-NFPA 1142-2014 [Chapter J]

Annex J Informational References

J.1 Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

J.1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1, *Fire Code*, ~~2012 edition~~ **2015**.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, ~~2010 edition~~ **2013**.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, ~~2010 edition~~ **2013**.

NFPA 13E, *Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems*, ~~2010 edition~~.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*, ~~2010 edition~~ **2013**.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, ~~2012 edition~~.

NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, ~~2011 edition~~.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, ~~2010 edition~~ **2013**.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, ~~2008 edition~~ **2013**.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, ~~2009 edition~~ **2014**.

NFPA 1451, *Standard for a Fire Service Vehicle Operations Training Program*, ~~2007 edition~~ **2013**.

NFPA 1901, *Standard for Automotive Fire Apparatus*, ~~2009 edition~~.

NFPA *Fire Protection Handbook*, 20th edition, 2008.

J.1.2 Other Publications.

J.1.2.1 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D 1557, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lbf/ft³ (2,700 kN-m/m³)]*, ~~2002~~ **2012**.

J.1.2.2 NASF Publications.

National Association of State Foresters, 444 North Capital Street NW, Suite 540, Washington, DC 20001.

www.stateforesters.org

J.1.2.3 NDMC Publications.

National Drought Mitigation Center, University of Nebraska-Lincoln, ~~239 LW Chase Hall,~~ **P 819 Hardin Hall, 3310 Holdrege Street**, P.O. Box ~~830749~~ **830988**, Lincoln, NE 68583-~~0749~~**0988**.

The National Drought Mitigation Center Directory of Drought Contacts, 2006.

Available online at: www.drought.unl.edu/contact>AboutUs/contactContactUs.htm.aspx

J.1.2.4 U.S. Government Publications.

J.1.2.4.1 NRCS Publications.

Natural Resources Conservation Service, 4th and Independence Avenue SW, Washington, DC 20250.

Conservation Practice Standard Dry Hydrant Code 432, ~~1999~~ **2011**.

Field Office Technical Guides (FOTGs)

Available online at: <http://www.nrcs.usda.gov/Technical/Standards/nhcp.html>

J.1.2.4.2 USDA Forest Service Publications.

www.fs.fed.us/fire

J.1.2.4.3 USGS Publications.

U.S. Geological Survey (USGS) Water Resources Information.

Available online at: <http://www.usgs.gov/ask/index.html> (alt)

J.2 Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

J.2.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1961, *Standard on Fire Hose*, ~~2002 edition~~ **2013**.

NFPA 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose*, ~~2003 edition~~ **2013**.

NFPA 1963, *Standard for Fire Hose Connections*, ~~2003 edition~~ **2014**.

J.2.2 Other Publications.

Handbook of PVC Pipe, Design and Construction, ~~Fourth~~ **Fifth** Edition, ~~2004~~ **2012**. The Uni-Bell PVC Pipe Association, Dallas, **2711 LBJ Freeway, Suite 1000**, Dallas, TX, 75234.

J.2.3 Other Resources.

J.2.3.1 Firewise Resources.

Using Water Effectively in the Wildland/Urban Interface (DVD or Video), 2004.

J.2.3.2 Wisconsin DNR Publications.

Wisconsin Department of Natural Resources, 101 South Webster Street, P.O. Box 7921, Madison, WI 53707-7921.

A Guide to Planning and Installing Dry Fire Hydrants, 2003.

J.3 References for Extracts in Informational Sections. (Reserved)

Statement of Problem and Substantiation for Public Input

Updated to current editions and updated address the National Drought Mitigation Center.

Related Public Inputs for This Document

<u>Related Input</u>	<u>Relationship</u>
<u>Public Input No. 56-NFPA 1142-2014 [Chapter 2]</u>	Current editions referenced.

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Public Input No. 58-NFPA 1142-2014 [Global Input]

Annex X. Geospatial Support for Water Supply Planning

X.1 General.

A geospatial (or geographic) information system (GIS) is an integrated set of software and hardware for the collection, management and analysis of data with a spatial (locational) component. GIS technology allows different sets of data (“layers”) to be overlaid spatially in order to perform comparative and relational analysis. GIS is often associated strictly with its mapping aspects, but equally important is its ability to manage large amounts of information about features. For example, the GIS records for a dry hydrant could include not only its physical location, but also data on its elevation, rate of flow, thread type, records of testing, accessibility, and any other information that could be of value in the planning process.

The use of a GIS in support of rural water supply planning offers great benefits to water supply officers and other fire protection planners. Many of the key elements of a rural water supply system must be spatially located and analyzed as part of the planning process: Water sources, supply routes, and values-at-risk. Using a GIS to manage locations and data associated with these elements, and to geospatially analyze the relationships among them, facilitates the development of effective and efficient water supply networks.

While a fire department may not have an in-house GIS capability, there are many potential partner agencies that do. Most counties and many municipalities have at least some dedicated GIS staff, and many colleges and universities have GIS faculty. Federal, state and local conservation agencies have in-house GIS capabilities, and many of these agencies will have an overlapping interest in developing fire protection water supplies. Although less capable than commercial GIS software, there are a number of free GIS packages available that could be adopted by a fire department. A notable example of this is the MARPLOT component of the CAMEO Suite software package used by the hazardous materials community that is freely available for download from the U.S. Environmental Protection Agency.

X.2 Water Supply Network Assessment.

Use of GIS in the water supply planning process allows the whole system to be analyzed as a network. Using a GIS, the water supply planner can readily determine coverage areas for a given water source, in terms of both distance and travel time.

Without GIS, water supply planners often attempt to estimate coverage areas by drawing concentric circles around water sources at one-mile intervals (or similar distances). This technique, while providing a rough estimate, does not take into account actual road travel distances, potential obstacles (such as railroad crossings), and tends to overestimate the coverage areas for water sources.

Use of a GIS with a network analysis capability can provide a truer estimate of coverage areas by modeling the road network as traveled by fire apparatus, and can provide coverage estimates in terms of both distance and travel time. A similar assessment can theoretically be made manually, but only with painstaking effort, and the results are likely to be less accurate.

In order to conduct a network assessment, the planner will need to obtain access to a GIS software package with the ability to conduct a network analysis. These types of analyses are commonly used in the shipping industry to model the actual travel of vehicles along a road network, and can be readily adapted to fire service planning purposes.

Using GIS network analysis techniques, planners can assess the current state of the water supply system, generating mathematical polygons that show the true coverage area of existing water sources, and reveal areas of weak or non-existent coverage. With detailed address or parcel data, the travel distance to all water sources for each address in a fire protection area can be rapidly estimated using GIS network analysis techniques. Factors hindering, or potentially hindering, travel of fire apparatus, such as steep slopes, difficult curves, bridge weight restrictions, and rail crossings can all be factored into the model, providing an accurate picture of the water supply network.

Once areas of inadequate water supply are determined, planners begin the search for potential water supply sources to improve the coverage network, with the search effort focused on identified areas of weakness. Use of GIS tools can be of great assistance in this process, with numerous potential sources of data available to assist in the search. Once candidate supply sites have been identified, planners can iteratively re-run the network analysis with the hypothetical sites included in order to determine the most effective configuration of the water supply network. The results of these hypothetical analyses can then be used to prioritize supply sites for development.

X.3 Stream Assessment.

When assessing a site along a flowing stream as a potential fire protection water supply source, knowledge of basic hydrologic concepts will assist the planner in understanding the characteristics of the site. The following definitions, adapted from the U.S. Geological Survey, apply to this section.

- (1) **Drainage Basin.** A part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water. Colloquially, the term “watershed” is used interchangeably with this term.
- (2) **Stream.** A general term for a body of flowing water. In hydrology the term is generally applied to the water flowing in a natural channel as distinct from a canal. More generally as in the term stream gaging, it is applied to the water flowing in any channel, natural or artificial.
- (3) **Streamflow.** The discharge that occurs in a natural channel. Although the term discharge can be applied to the flow of a canal, the word streamflow uniquely describes the discharge in a surface stream course. The term “streamflow” is more general than runoff, as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.
- (4) **Stream Gaging Station.** A gaging station where a record of discharge of a stream is obtained. Within the U.S. Geological Survey this term is used only for those gaging stations where a continuous record of discharge is obtained.
- (5) **Watershed.** Technically speaking, “watershed” refers to the divide separating one drainage basin from another and in the past has been generally used to convey this meaning. However, over the years, use of the term to signify drainage basin or catchment area has come to predominate. “Drainage divide,” or just “divide,” is used to denote the boundary between one drainage area and another.

Hydrologists divide and sub-divide the United States into standardized, successively smaller drainage basins, known as “hydrologic units.” Each hydrologic unit is uniquely identified by a code consisting of an even number of digits, known as the “hydrologic unit code” or HUC. This system applies from the largest drainage systems (e.g. the Mississippi River Basin) down to the smallest streams in a nested fashion. For example:

Hydrologic Unit Level	Hydrologic Unit Code (HUC)	Drainage Basin Name	Drainage Basin Area (square miles)
2-digit	05	Ohio River basin	189,422
4-digit	0508	Great Miami	5,368
6-digit	050800	Great Miami River	5,368
8-digit	05080001	Upper Great Miami River	2,480
10-digit	0508000115	Headwaters Mad River	135
12-digit	050800011501	Macochee Creek	19

(Note: In this example, the 4- and 6-digit hydrologic units are the same; this is not always the case)

In the United States, hydrologic data for any drainage basin and its associated streams will commonly be located by using the correct HUC designation. Data for the drainage basins at the 8-digit and 12-digit levels are most commonly used, often referred to by the shorthand “HUC-8” or “HUC-12.”

Supplemental to the techniques presented in section B.3.1 (Natural Water Sources – Streams) of

this document, water supply planners may be able to take advantage of several resources that may be useful in assessing flowing streams as potential sources of fire protection water supply.

(1) *StreamStats*. The U.S. Geological Survey, in cooperation with state and local agencies, provides the StreamStats tool as a freely-available, web-based tool to estimate stream flows in many parts of the United States. StreamStats uses hydrologic modeling to estimate streamflow for both gaged and ungaged streams, and is considered by hydrologists to provide very accurate estimates. The availability of StreamStats varies by state, as do the model outputs available. In some states, StreamStats provides low-flow estimates by month -- data that will be immensely useful in water supply planning. For other states, however, StreamStats outputs are limited to peak flows, which will not be particularly useful for these purposes. The functionality of StreamStats is continually upgraded, state by state. Water supply planners in states without low-flow modeling capabilities should monitor the status of StreamStats for their state for upgrades, and consider engaging the local U.S. Geological Survey point of contact about getting the necessary functionality for their state. StreamStats may be accessed at <http://streamstats.usgs.gov>.

(2) *Cooperative Stream Gage Network*. The U.S. Geological Survey, in cooperation with state and local agencies, manages a nationwide network of more than 7000 automated stream gages located at strategic locations along the country's waterways. Most of these gaging stations report streamflow data in near-real-time, and this data can be accessed via the National Streamflow Information Program (NSIP) website at <http://water.usgs.gov/nsip>. Many of the gaging stations in the network have compiled several decades' worth of streamflow data at their location. Even in cases where the stream under consideration is not gaged, planners should examine flow data from gaging stations in the immediate vicinity in order to understand seasonal hydrologic trends for the region. This will provide an idea of when low-flow conditions are likely to occur, and thus allow manual streamflow determinations (as described in section B.3.1) to be conducted at the appropriate times to capture low-flow conditions.

(3) *State Environmental Protection Agencies*. State-level environmental protection agencies concerned with water quality monitoring often determine low-flow estimates for streams at the 12-digit hydrologic unit level. While data for every watershed will not be available, water supply planners should consider inquiring with their state's environmental protection agency to determine whether low-flow data may be available for the watershed containing any potential water supply site being considered for further development.

Water supply planners should note that streamflow information from the U.S. Geological Survey and allied state and local agencies is often provided in cubic feet per second (cfs). These data can be converted to gallons per minute (gpm) for fire planning purposes by use of a conversion factor:

$$Q_{\text{gpm}} = Q_{\text{cfs}} \times 448.831169$$

Where Q_{gpm} is flow in gallons per minute, and Q_{cfs} is flow in cubic feet per second.

Water supply planners should be careful to differentiate between total estimated streamflow, and the proportion of that flow that can be captured and exploited for water supply purposes. Unless a stream is to be fully impounded, only a fraction of the total estimated flow will be exploitable, with the amount dependent on streambed characteristics and fire department drafting equipment capabilities. Methods described in this document yield total flow estimates, including, in some cases, flow occurring below the surface of the streambed. Further study of proposed drafting sites will be necessary to determine whether the site is truly suitable as a fire protection water supply source.

X.4 Pond Assessment.

There are many manual techniques for estimating the depth and volume of water in ponds, lakes and similar water bodies. These manual methods have the disadvantage of providing generalized estimates for the entire water body, rather than detailed depth profile information. Using GIS when assessing ponds as potential water supply sources can yield detailed volume estimates as well as detailed depth profiles that can assist in locating dry hydrant placement sites.

The depth and volume of ponds and lakes tend to fluctuate seasonally within the year, as well as varying from one year to the next. For fire protection water supply planning purposes, it is important to collect depth and volume data representative of low-water (drought) conditions, when volumes are expected to be at their minimum. In order to most accurately reflect low-volume conditions, depth soundings should generally be collected when the pond or lake is at its seasonal

low depth. Accessing U.S. Geological Survey streamflow data from gaging stations in the vicinity of the pond can help the planner to understand the seasonal hydrologic fluctuations affecting the region, and help plan the appropriate time to take soundings. Generally, when local streams are at their lowest seasonal flows, local ponds and lakes are also likely to be at their lowest levels.

When pond depth soundings are collected in conjunction with a geospatial position system (GPS) unit, the data (latitude, longitude, and depth) can be analyzed in any GIS system with a three-dimensional analysis capability to yield detailed volume estimates and depth contours (bathymetry). The depth contours developed with these tools can be used to guide placement of dry hydrants and other drafting facilitation devices.

While depth soundings have traditionally been collected manually using plumb lines or poles, these methods are inefficient, requiring considerable time to collect relatively few readings. Use of a portable recreational sonar unit ("fish finder") on a small watercraft, especially when combined with a GPS unit, can yield many more soundings, of equal quality, in a shorter period of time. With practice, more than 100 soundings per hour can be collected using this method. This is an important consideration when using a GIS system to develop bathymetry data for the pond. The more data collected in the field, the more accurate the resulting GIS-generated estimates will be.

X.5 Planning for Water Supply.

X.5.1 Water Supply Zones. The establishment of water supply zones (WSZ), driven by geography, needed fire flow (NFF) estimates, and water supply source capabilities, provides a framework for water supply planning, and will be greatly facilitated by the use of GIS tools. Once NFF have been estimated for the planning area, properties can be grouped according to location and NFF requirements, and water supply can then be planned for the group. Properties with exceptionally high NFF requirements may be identified as target hazards and receive individual water supply planning attention, rather than attempting to plan fire protection for a larger area based on a single high-demand property.

X.5.2. Water Shuttle Routes. On rural road networks, it is beneficial to establish mobile water supply apparatus (tanker/tender) shuttle routes with one-way traffic flow when possible, thereby avoiding the need for fire apparatus to pass one another on narrow roadways. Shuttle routes can be readily pre-planned using a GIS, ensuring that all properties in a fire protection area are linked to an established water supply source by a designated shuttle route. Generally, shuttle routes should be in the form of a loop beginning and ending at the water supply source, although out-and-back routes with two-way traffic flow may be unavoidable in some areas. Pre-designated water shuttle routes may also form the basis for planning water supply zones, with all properties bordering a pre-planned shuttle route grouped together in a zone.

X.5.3 Water Supply Designations. For every water supply zone (WSZ) or target hazard in a fire protection area, planners should consider designating associated water supply sources as follows:

(1) **Primary Water Source.** This is the principal source expected to meet the estimated NFF requirements of the WSZ or target hazard. In most cases, this will be the closest developed water supply source to the WSZ, although in the case of target hazards with high NFF requirements, closer sources may be bypassed in favor of a more distant source with higher capacity. Primary sources should have no seasonal or access restrictions, and should be designed with sufficient capacity to meet all NFF requirements of their assigned WSZ or target hazard. A given source may serve as the primary supply source for more than one WSZ. Primary supply sources should have the highest priority for allocation of water supply development effort and funding.

(2) **Secondary Water Source.** For each WSZ, one or more secondary water supply sources should be identified in addition to the primary source. Secondary sources, alone or in combination, should be able to meet the NFF requirements of the WSZ or target hazard. Secondary sources should be as reliable as primary sources, but may be less favorable due to distance, or the need to combine multiple secondary sources to achieve the NFF requirement. Secondary sources serve as a back-up to the primary source, in the event that it is unavailable, and provide additional supply when needed. Secondary sources for one WSZ may serve as the primary source for a different WSZ or target hazard.

(3) **Supplemental Water Source.** Potentially usable water supply sources that do not meet the capacity or accessibility requirements to be designated as primary or secondary sources should still be assessed and planned as potential supplemental sources of supply. These sources may have seasonal limitations due to drought or freezing, have unacceptable volume or flow, or suffer from other limitations. Planners should not overlook the potential

of these sources, under certain circumstances, to augment other water supplies or serve as an initial attack resource.

X.5.4 Water Supply Facilities. In addition to the development necessary at water supply sources to support access and stationary drafting, planners should also consider needs at the point of water delivery, commonly referred to as the dump site. For each water supply zone (WSZ), it may be beneficial to pre-identify areas with sufficient space to accommodate the portable tanks, drafting engines, and apparatus maneuver area necessary to support delivery of water at the dump site. Construction or expansion of hard surface areas for dump site operations may be necessary to support safe and effective dump site operations. Establishment of pre-designated dump sites for a WSZ, with provisions for attack engine supply via a large-diameter hose (LDH) lay, may be a better option than attempting operations closer to an incident scene where there is limited space for portable tanks and apparatus maneuvering. Planning locations for these sites, along with estimates of needed LDH lays, will be greatly facilitated with the use of GIS tools.

X.6. Geospatial Technical Resources.

X.6.1. National-Level Geospatial Data Sources. The following geospatial data sets are in the public domain, are freely available for download, and are in file formats usable by all major GIS software systems. These data sets are maintained at the national level by federal agencies, but users may download smaller subsets for their area of interest.

(1) **National Hydrography Dataset (NHD).** A networked dataset of all known stream features, covering the entire United States. In addition to stream features, lakes, springs, wetlands, gages, dams and other hydrologic features are included, although these data are less comprehensive than the stream data. The NHD can assist the planner in locating streams and understanding the local hydrologic environment. Further information and data downloads at <http://nhd.usgs.gov/>

(2) **Watershed Boundary Dataset (WBD).** A seamless data set containing all hydrologic units (drainage basins), at all hierarchical levels (HUC-2 through HUC-12) for the United States. The WBD is maintained by the U.S. Geological Survey, and data are available for download in pre-configured sets by region or state. The WBD can assist the planner in understanding the local hydrologic environment, and in determining which drainage basins for which additional information on streamflow will be required. Further information and data downloads at <http://nhd.usgs.gov/wbd.html>

(3) **National Wetlands Inventory (NWI).** The U.S. Fish and Wildlife Service maintains the interagency National Wetlands Inventory (NWI) for the United States, which can also be of assistance in locating potential water supply sources. Not all identified wetlands will be suitable for development as water supply sources, but many are associated with ponds or other deep water bodies that may be suitable. In the near future, the NWI will be superseded by the Surface Waters Inventory (SWI), an improved system with expanded data. The NWI is accessible online at <http://www.fws.gov/wetlands/>

(4) **National Agriculture Imagery Program (NAIP).** Under this program, the U.S. Department of Agriculture collects full-color aerial photography during the peak growing season ("leaf-on") at one-meter resolution, for purposes of conservation planning and program compliance monitoring. Imagery is collected on a state-by-state basis, with a new set collected every two to three years, generally. This imagery will be of assistance in locating potential water supply sources that are not visible from ground level when obscured by vegetation or topography. NAIP imagery is provided as county-level mosaic files, and may be downloaded at <http://datagateway.nrcs.usda.gov/>

(5) **Land Cover Datasets.** Both the U.S. Department of Agriculture (USDA) and U.S. Geological Survey (USGS) maintain national land cover datasets derived from satellite imagery. The two datasets are complementary, with each emphasizing different land cover types. Both datasets contain information on water bodies, and can be used to locate potential water supply sources not visible from ground level. The USDA National Agricultural Statistics Service CropScape data set can be accessed at: <http://nassgeodata.gmu.edu/CropScape/> and the USGS National Land Cover Dataset (NLCD) can be accessed at: <http://landcover.usgs.gov/>

(5) **TIGER Files.** The U.S. Census Bureau maintains the TIGER (topologically integrated geographic encoding and referencing) files. TIGER is a comprehensive set of geospatial data covering all political boundaries, roads, census data collection units (tracts, blocks, etc.), landmarks, and other features in the United States. In many cases, TIGER geodata are

not perfectly accurate when compared to more detailed local sources or aerial photos. However, where higher resolution data are not available, TIGER geodata will yield very acceptable results. TIGER data sets also have the advantage of being topologically integrated across political boundaries, making the roads data especially well-suited for network analysis purposes. TIGER files are available for download at <http://www.census.gov/geo/maps-data/data/tiger-line.html>

X.6.2. Local Geospatial Data Sources. The type and quality of geospatial data sets available from state, county, municipal and private sector sources is widely variable in terms of content and quality, yet in many cases these data sources will prove to be very valuable for the planning effort. Common local sources of geospatial data include, but are not limited to, the following:

(1) *Dispatch Centers.* Computer assisted dispatch (CAD) systems are based on various GIS software platforms, and local dispatch centers generally have access to some of the most accurate road and addressing data available. These centers may be able to provide their geospatial data to water supply planners in exportable file formats for use in other GIS systems.

(2) *Engineering and Transportation Agencies.* State departments of transportation and county-level engineer offices often have extensive data sets regarding road networks, bridges, rail crossings and other transportation network items.

(3) *Property Taxation Agency.* The local agency responsible for property tax valuation may be a source of detailed parcel and improvements data for use in GIS, data sources that can assist the planner in assessing the effectiveness of the water supply network. Additionally, these agencies often purchase high-resolution aerial photography of their jurisdiction to assist in property valuation, sometimes including oblique-angle imagery. In many cases, imagery acquired for these agencies will be among the highest quality and most current of all available sources.

(4) *Water Utilities.* Local and regional water utilities often maintain geospatial data sets on water mains, hydrants, and other water supply items.

X.6.3. Conservation Agencies. For planning rural water supply networks, conservation, natural resources, and environmental agencies at all levels of government can be of great assistance. These agencies have an interest in water resources, and generally have a high degree of expertise on the subject, although agency staff may not be specifically versed in fire protection needs. Additionally, these agencies tend to have GIS expertise within their staffs, and may be able to provide technical support. Water supply planners should make contact with the local representatives of these agencies early in the planning process to determine what data and technical assistance may be available.

(1) *Federal Agencies.* The most ubiquitous federal agency with regard to water supply planning is the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The NRCS has a presence in nearly every county, and the agency has deep expertise in hydrology, water source development, engineering, and GIS. Normally, NRCS offices are co-located with local conservation districts (discussed below), with staff of the various agencies working cooperatively on conservation planning and related efforts. Other federal agencies that may be locally important include the USDA Forest Service, the land management agencies of the U.S. Department of the Interior (Bureau of Land Management, National Park Service, Fish and Wildlife Service, and Bureau of Indian Affairs), Department of Defense military installations, and others depending on the specific location.

(2) *State Agencies.* The state-level natural resources and environmental quality agencies can be a potential source of geospatial data and technical support, although capabilities and interests vary widely across the country. Water supply planners should familiarize themselves with their state's agencies and make contact to determine what assistance may be available.

(3) *Conservation Districts.* The more than 3,000 conservation districts in the United States are organized along county or watershed boundaries, and provide local-level support to agricultural and natural resources conservation efforts in cooperation with NRCS and state agencies. Technicians and specialists working for these agencies are generally very well versed in water source development, and can be of great assistance in the development of water supply networks. The specific names for conservation districts vary from state to state, but planners may determine their local district at the following site:
<http://www.nacd.net/about/districts/directory>

(4) *Non-Governmental Organizations (NGOs)* . Certain conservation-oriented NGOs may be locally important to the water supply planning process, as some of these organizations have expertise in hydrology, wildland fire management and GIS. Planners should familiarize themselves with locally active conservation NGOs, particularly those managing nature preserves and other protected lands, to determine what assistance they may be able to offer.

Statement of Problem and Substantiation for Public Input

Inclusion of this proposed geospatial information systems (GIS) support annex provides amplifying material for water supply planners regarding the use of GIS tools to assist in the effective implementation of the NFPA 1142 standard.

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Submittal Date: Mon Jun 30 20:58:26 EDT 2014